

Use of a Game Over: Emulation and the Video Game Industry, A White Paper

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I. INTRODUCTION

¶1 For the past several years the music industry has waged a controversial and unyielding battle against what it calls “pirates.”¹ Will the video game industry follow suit, or will it chart a new direction for intellectual property management in information goods?

¶2 A decade ago, video game emulators epitomized the cutting edge of programming technology. Ten years hence, they are the subject of a heated debate over copyrights and the video game industry’s future.² Emulators, which provide conversion software that enables games to run on personal computers (“PC’s”) and other systems or platforms for which they were not originally designed, have become a staple among gaming enthusiasts. Several factors have contributed to the robust market for emulation: the continued growth of the internet, the emergence of peer-to-peer (“P2P”) file sharing technology, and the major console manufacturers’ persistent inattention to latent market demand for access to older games. Ignoring pent-up demand will drive the unsatisfied customer to alternative sources; in this case, peer-to-peer networks where emulation software is available for free. Today, game enthusiasts can download 298 Nintendo 64 (“N64”) games along with an emulator in less than one hour, an act that results in a potential US\$10,920 loss per customer to the gaming industry.³ Sony’s litigation against emulator makers Connectix and Bleem! in 2000 signals that the gaming industry now recognizes that emulation threatens its business model, which is predicated on: planned obsolescence; a singular, controlled user experience on the console manufacturer’s hardware; and a profit model dependent on margins from software sales.⁴

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¹ Charles C. Mann, *The Year the Music Died*, WIRED, Feb. 2003, at 92, *available at* wired.com/wired/archive/11.02/dirge.html.

² Howard Wen, *Why Emulators Make Video Game Makers Quake*, SALON, June 1999, at <http://www.salon.com/tech/feature/1999/06/04/emulators/print.html> (last visited July 4, 2004).

³ This figure was calculated by tallying the number of N64 emulated games available on file-sharing services multiplied by the average retail price of \$39 per game.

⁴ See *Sony Computer Entm’t v. Connectix Corp.*, 203 F.3d 596 (9th Cir. 2000) (holding development and

¶3 Not surprisingly, distinct fault lines have emerged in the emulation debate. The video game console manufacturers and game publishers contend that emulation is illegal and infringes their intellectual property rights.⁵ Interested in enforcing their copyrights, they litigate in an effort to shut down emulators.⁶ By contrast, the community of emulation users questions whether unauthorized emulation is really a violation of the original innovator's intellectual property rights.⁷ The emulation user community insists that emulation only preserves its right to enjoy old video games, many of which are no longer commercially available.⁸ Further, customers may already have the rights to these games, albeit in different formats. As emulation advocate, T. Liam McDonald, author of *You Will Be Emulated* states, "The problem isn't the rise of emulators. It's that there are too few of them."⁹

¶4 The response of console manufacturers to the emulation phenomenon presents striking parallels to the past tactics of the music and motion picture industries, in which incumbent IP owners claimed that "shifting" content from one media platform to another infringed copyrights. In *Recording Industry Association of America (RIAA) v. Diamond Multimedia*, and *Universal v. Sony*, the incumbent value chain members in the music and motion picture industries failed to embrace the opportunities associated with the new technology.¹⁰ Instead, RIAA defended traditional business models by waging a legal

release of an emulator is non-infringing provided that no patents were violated and that the final product did not contain any infringing code, and also holding that emulation itself is a protected fair use of computer software). Sony sued Connectix over a commercial emulator designed to run on Macintosh computers. Sony claimed that Connectix's reverse engineering of the PlayStation's basic input/output system ("BIOS") violated copyright laws, despite the fact that the PlayStation's actual BIOS appeared nowhere in the Connectix emulator. Sony sought to obtain a preliminary injunction against Connectix, to prevent the use of the PlayStation BIOS and prevent the marketing of the emulator. Connectix countered by arguing that copying and reverse engineering the PlayStation BIOS was protected as "fair use" under current copyright law. The Ninth Circuit (which recently ruled in the *Napster* case) found in favor of Connectix, and the emulator was published for both Macintosh and Windows operating systems. See also *Sony Computer Entm't v. Bleem, LLC*, 214 F.3d 1022 (9th Cir. 2000) (holding that Bleem!'s use of copyrighted images from PlayStation games was protected by "fair use"). Only a few months after *Connectix*, Sony filed *Bleem LLC*, for again infringing on copyrighted material. Sony alleged that Bleem!'s use of copyrighted images from PlayStation games amounted to copyright infringement. Bleem!, however, claimed that the use of these images was purely for comparative purposes, in order to show the Bleem! emulator's superior graphics, and that such use constituted protected "fair use." Although this case was ostensibly about the comparison of copyrighted images on the boxes of Bleem!'s software, Sony's ultimate goal was the same as in the *Connectix* case: to obtain a preliminary injunction which would effectively prevent Bleem! from marketing the software. In this case, the court noted that, while it was unlikely that the emulator would negatively impact the sales of PlayStation games, it would very likely cut into the market share enjoyed by the PlayStation console. However, the Ninth Circuit again found that the use was protected and vacated the injunction.

Although Bleem! won most of its lawsuits against Sony, Bleem! lost a lot of time and money in court. The lack of Bleem!'s success and the fact that many gamers were moving on to newer, better systems eventually led to Bleem!'s demise. In November 2001, Bleem! was acquired and shut down by Sony.

⁵ See generally Dale Dallabrida, *Vintage Video Games Stick Around as a Blast From the Past*, THE NEWS JOURNAL, Apr. 8, 2003, available at <http://www.delawareonline.com/newsjournal/life/2003/04/08vintagevideogam.html> (last visited July 4, 2004).

⁶ See, e.g., *Connectix*, 203 F.3d at 596; *Bleem LLC*, 214 F.3d at 1022.

⁷ T. Liam McDonald, *You Will Be Emulated*, MAXIMUM PC, Sept. 1999, at 41.

⁸ *Id.*

⁹ *Id.*

¹⁰ In *Recording Industry Ass'n of Am. v. Diamond Multimedia Sys.*, 180 F.3d 1072, 1081 (9th Cir. 1999), the Ninth Circuit ruled that Diamond's Rio MP3 audio player was not in violation of the Audio Home

battle against those supporting the new paradigm.¹¹ As recent observation of the recording industry suggests, the industry's pursuit of legal protection of its rights without addressing the market drivers that made Napster, Gnutella, and KaZaA popular, has resulted only in the loss of public good will.¹² Indeed, in its approach to addressing the P2P music-sharing phenomenon, the recording industry is engaged in an ever more elusive battle to protect its rights at the expense of criminalizing and alienating its customers.¹³

¶5 Today, video game console manufacturers and game publishers find themselves at a similar juncture. They can follow in the footsteps of the music and film industries and use litigation to stifle and shut down the innovation that is emulation. This approach will be quite costly, and it will neither endear them to their customers nor ultimately stop emulator proliferation. In the opinion of longtime industry critic Timothy White, this will only delay the inevitable.¹⁴ Alternatively, they can take seriously the customer demands that fuel emulator popularity and chart a different course. Rather than making legal action the sole response, they can adopt a more nuanced, sophisticated approach in which they co-opt the market by entering the business of emulation themselves. By listening to their customers and thinking creatively about their business models, game console manufactures and software publishers can protect their markets, their brand equity, their intellectual property, and grow consumer good will.

¶6 This article examines the question of emulation technology from both perspectives and suggests that the solution for incumbent property rights holders requires more than vigorous litigation. We contend that the video gaming industry should undertake the coordinated management of strategy, pricing, and property rights if it is to be successful at harnessing emulation opportunities. Console manufacturers and game publishers should consider how to build their competitive advantage by responding to the unmet consumer demand that drives the emulation phenomenon, pricing their products reasonably and dynamically so as not to drive customers to emulators, and using the law judiciously to protect their intellectual capital.

¶7 Technology enterprises in Japan are well-positioned to provide a model for how companies can constructively manage intellectual capital in the video game industry.¹⁵ If successful, such a model may be transferable to multiple information goods industries, including music and film. Sony Corporation, which has for six decades prided itself on industry leadership, has already started this process.¹⁶ Responding to customer demand

Recording Act of 1992, 17 U.S.C. 1001-1010 (2004). The Rio was not a "digital audio recording device" as defined by the AHRA, but "...the Rio is a device that makes copies in order to render portable, or 'space-shift,' those files that already reside on a user's hard drive... Such copying is paradigmatic non-commercial personal use entirely consistent with the purposes of the [AHRA]." *Id.* at 1079. The Ninth Circuit noted that manufacturers of audio recording and playing equipment pay a small per-unit royalty to the music industry to partially offset the threat of audio piracy; however, this same agreement did not cover computer equipment. As a result, Diamond won its case and was allowed to continue the sale and manufacture of its Rio. *See also* Sony Corp of Am. v. Universal City Studios, Inc., 464 U.S. 417 (1984) (holding that that private, non-commercial copying of television broadcasts is fair use).

¹¹ Recording Industry Ass'n of Am., 180 F.3d at 1081.

¹² *See generally* Matt Bal, *Hating Hilary*, WIRED MAGAZINE, Feb. 2003.

¹³ *Id.*

¹⁴ *See generally* Charles Mann, *The Year the Music Died*, WIRED MAGAZINE, Feb. 2003, available at <http://www.wired.com/wired/archive/11.02/dirge.html?pg=1> (last visited July 4, 2004).

¹⁵ Sony, Nintendo, and Sega are all Japanese companies.

¹⁶ *See generally* SHU SHIN LUH, *BUSINESS THE SONY WAY* (John Wiley & Sons 2003).

for backward compatibility, Sony configured its PlayStation2 (“PS2”) to support games developed for the original PlayStation.¹⁷ As the first console manufacturer to offer backward compatibility, it has generated substantial customer good will.¹⁸ Yet Sony can do more. In the early 1980s, Sony fought for the diffusion of the Betamax VCR technology that culminated in the landmark United States Supreme Court ruling, *Sony Corp. of Am. v. Universal City Studios*, which held that the delayed rebroadcast of a movie to an individual qualified as fair use.¹⁹ Yet now that Sony owns the content (games) and someone else owns the new, threatening technology (emulation software), Sony is using its own legal team to fight the new technology.²⁰ We submit that there is another approach. Rather than behaving reactively by suing emulators until they are driven out of business or are acquired and dismantled, Sony and its fellow console manufacturers need to behave proactively by harnessing emulation to their competitive advantage.

II. EMULATORS AND THE VIDEO GAME VALUE CHAIN

A. Emulation

¶8 An emulator is a piece of hardware/software that allows a user to execute game software on a platform for which the software was not originally intended. For example, video game emulators allow a personal computer to function almost identically to a video game console or an arcade game system.

¶9 There exist three basic types of emulators—pure software, pure hardware, and hybrid systems²¹—which are detailed in Exhibit 1.²² The video game emulator, the focus of our research, is characteristic of the pure software form, also known as a ‘true’ emulator. The elements required to create a pure software video game emulator platform are shown in Figure 1.

¶10 To create a software-based video game emulator, the operating system of the video console must be either reverse engineered or extracted through a basic input/output

¹⁷ See generally Dallabrida, *supra* note 5.

¹⁸ *Id.*

¹⁹ 464 U.S. 417, 422 (1984). In this now-famous “Betamax case,” Sony argued that court actions by Universal (and Disney) were an unlawful infringement of legal technology. Universal argued that Sony's new Betamax videocassette recorder (“VCR”) permitted the unlawful duplication of their copyrighted television programs. The case worked its way through the courts, eventually reaching the U.S. Supreme Court who eventually ruled that private, non-commercial copying of television broadcasts does indeed qualify as fair use:

[Even when an entire copyrighted work was recorded, such copying is deemed fair use] because there is no accompanying reduction in the market for [the] plaintiff's original work A use that has no demonstrable effect upon the potential market for, or the value of, the copyrighted work need not be prohibited in order to protect the author's incentive to create.

Id. *Universal* is often cited by “free software” advocates concerning personal duplication of computer software that is not intended for anything beyond private use, and has been successfully used on more than one occasion to defend the practice for various and sundry reasons. This is not a successful defense for software piracy, though, since such piracy is direct, not contributory, infringement.

²⁰ See, e.g., *Connectix Corp.*, 203 F.3d at 596; *Bleem, LLC*, 214 F.3d at 1022.

²¹ Sam Pettus, *Emulation: Right or Wrong*, EMUFAQ (1999), at <http://www.worldofspectrum.org/EmuFAQ2000> (last visited Apr. 1, 2004).

²² See *infra* Appendix Exhibit 1: Types of Emulation. (Exhibits are appended; figures are embedded.)

system (“BIOS”) dump.²³ Next, the source code contained within the video game cartridge or CD-ROM must be extracted through a ROM dump. ROM Patches²⁴ facilitate modification of ROM files in the event that compatibility issues should arise between the ROM file and the user’s PC.²⁵ As it turns out, the manner in which software-based video game emulators are engineered plays a crucial role in determining their legality.

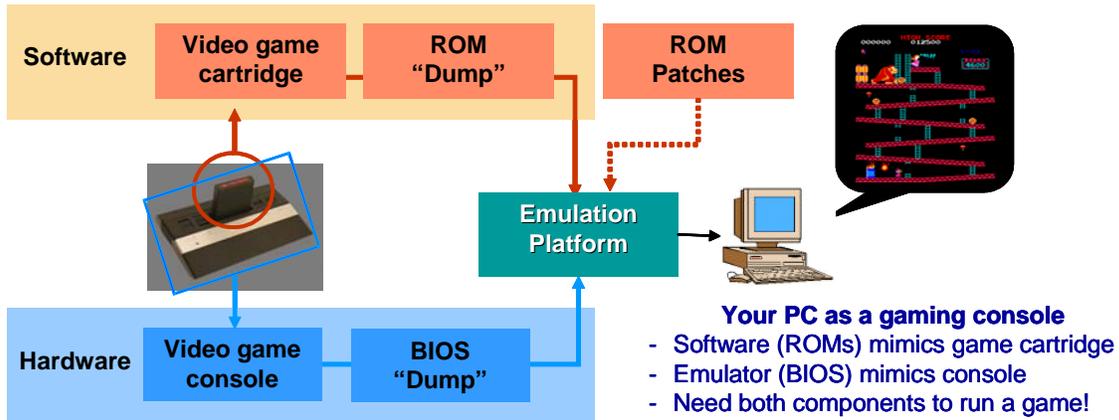


Figure 1: Components of a Software Video Game Emulator

1. What is Emulated?

¶11 Not all video games and console systems are emulated.²⁶ The three factors that likely influence whether or not a video game or system is emulated are: console popularity, availability of information regarding system hardware and software, and the technical difficulty of the emulation itself. In general, demand for a suitable emulator for a game system correlates directly with the popularity of a video game console when it was available in the retail marketplace.²⁷ Consoles possessing a large selection of popular video games are frequently emulated. Thus the emergence of emulators for N64 and Atari 2600 consoles should be no surprise to manufacturers given that historic sales data highlight the popularity of the original systems.

¶12 There are also a number of technical considerations that influence which systems are emulated and the time required to do so. First, because emulators are typically reverse engineered, the amount of publicly available information about the design of a system has a direct impact on the length of time it will take to develop a given emulator.²⁸ Emulating a video game system for the first time, without detailed information on the parent system’s hardware and software, can be a time consuming process. Moreover, advanced technologies and anti-piracy encryption often are barriers to emulation. For

²³ *Id.*

²⁴ ROM is Read Only Memory, and a ROM Patch is a small section of code that is added to a program to facilitate some desired functionality.

²⁵ *Id.*

²⁶ See Appendix Exhibit 2a, Video Game Console Emulation Timeline.

²⁷ See *infra* Section II.A.2.

²⁸ The authors estimate that the amount of time such a task would take would be inversely proportional to the amount of information available (i.e., technical information about the platform and software system to be emulated).

example, the Atari 7800 contained an encryption algorithm that effectively prevented emulation for a period of years.²⁹ Likewise, as newer consoles incorporate high quality graphics, there is a time lag before PCs can provide the requisite graphics/processing power required to offer the user of an emulated system an experience of comparable quality to that of the actual video game console and television.³⁰

2. When does Emulation Occur?

¶13 Unlike PCs, whose processing power can be upgraded at regular intervals, video game consoles consist of static technology for the duration of the console's life cycle. The static nature of the video game console makes it a prime target for emulation. As PC processing power increases, so too does the quality of graphics and game play. As such, the more powerful a PC becomes, the easier it is to emulate the latest console systems. The better the emulator can approximate the console experience, the greater the consumer demand for it will be.

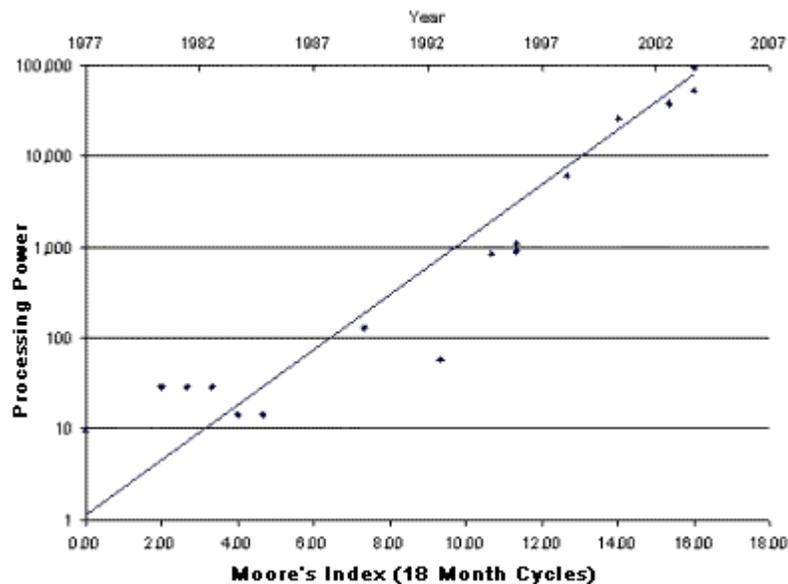


Figure 2: Processing Power Of Gaming Consoles³¹

¶14 A recent study shows that Moore's Law, which hypothesizes that the processing power of PCs doubles every eighteen months, is also upheld in the video game console industry.³² Figure 2 illustrates the processing power of select gaming consoles over the last twenty-four years. It is important to note that the average lifecycle per gaming console is roughly five years. Each console is designed for obsolescence: during the final

²⁹ See AtariAge, *Atari 7800 FAQ*, at <http://www.atariage.com/7800/faq/?SystemID=7800> (last visited July 4, 2004).

³⁰ Reverse engineering of the targeted product (which includes the software, platform, etc.) is part and parcel of the emulation development task.

³¹ See generally Lee Liaw, *The Development of the Gaming Console Industry Past, Present and Future*, available at http://ep2010.salzburgresearch.at/knowledge_base/gibson_2003a.pdf (last visited July 4, 2004).

³² Intel and other chipmakers produce processors that support this hypothesis.

year of its lifecycle, a next generation console is introduced, and users are migrated from the old console to the new one.

¶15 Trends in PC improvements relative to console technology thus create a window of opportunity in which PCs can emulate game consoles.³³ Software emulators are typically introduced during the fourth year of the game console lifecycle.³⁴ By this point, emulator developers have had sufficient time to refine their emulators, and PC processing power is high enough relative to the processing power of the gaming console that supports the emulation.³⁵

¶16 For example, the N64 was introduced in 1996 with processing power that equaled that of the 1994 Intel Pentium processor.³⁶ By the fourth year that N64 was on the market, the processing power of the Intel Pentium III was twenty times greater.³⁷ At this time, the first N64 emulator, UltraHLE, was introduced by Epsilon.³⁸

B. The Video Game Rent Chain³⁹

¶17 Prior to the advent of video game emulators, console manufacturers controlled the video game “value chain.” Console manufacturers determined which games were produced for their consoles and thus tightly controlled consumer access to those games. The introduction of emulators disrupted this value chain. Consumers are no longer required to buy the gaming console or the software, since both components can be easily downloaded from the Internet. In Figure 3, the first “bowtie” illustrates the video game value chain prior to the advent of emulators, and the second “bowtie” illustrates the disruptive nature of emulation.⁴⁰

¶18

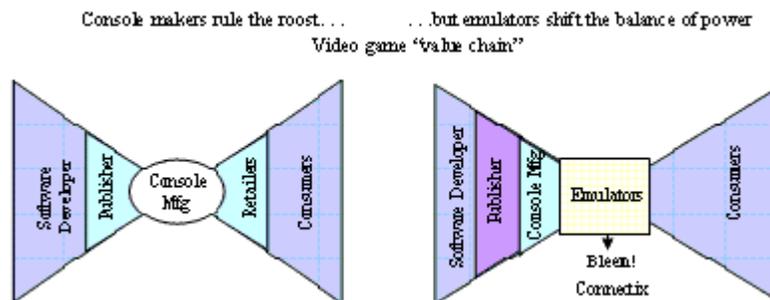


Figure 3: Video Game Value Chain Prior to and Following Advent of Emulators

¶19 Traditionally, console manufacturers have operated on an “installed base” or “razor/razor blade” model: selling game hardware at a loss in order to profit from

³³ See Appendix Exhibit 3a: Processing Power Comparison: PC v. Game Console.

³⁴ *Id.*

³⁵ *Id.*; see *infra* discussion of Moore’s Law at Section II.A.2.

³⁶ See Appendix Exhibit 3b: Processing Power Comparison: Intel v. Nintendo 64.

³⁷ *Id.*

³⁸ See generally Emulator Zone, *UltraHLE*, at <http://www.emulator-zone.com/doc.php/n64/ultrahle.html> (last visited July 4, 2004).

³⁹ See Appendix Exhibit 4: Video Game Industry Value Chain.

⁴⁰ See Analysis Group, *Disruptive Technologies*, at <http://www.disruptivetechologies.com/> (last visited July 4, 2004).

subsequent software sales.⁴¹ During the planned life of a game console, console manufacturers reap the bulk of their profits from video game sales.⁴² Hence, the real threat posed by emulators lies in their ability to deprive console manufacturers of recurring revenue from software sales. Emulators, which enable consumers to download video game ROMs for free, result in a loss of video game software revenue, amounting to approximately thirty-nine dollars retail per game title. This phenomenon impacts the entire value chain, as demonstrated by Figure 4.⁴³

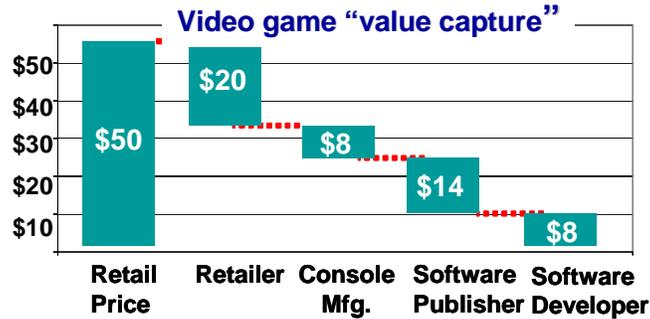


Figure 4: Video Game "Value Capture" Across the Value Chain

C. A Case Study: UltraHLE

¶20

Epsilon, Realityman’s 1999 introduction of UltraHLE, an N64 emulator, marked a significant milestone for the emulation community since it was the first fully-functional emulator of a current generation console.⁴⁴ Consumers quickly and easily downloaded the UltraHLE and the N64 ROMs, posing a serious threat to Nintendo. Figure 5 illustrates the revenues associated with the sales of N64 software from 1996 to 2002.

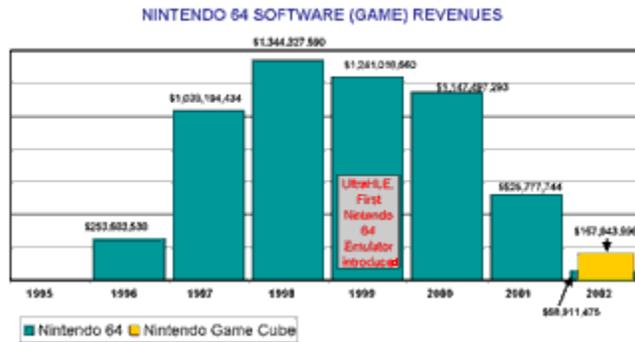


Figure 5: Nintendo 64 Software Game Revenues

⁴¹ See Terry Lefton & Todd Wasserman, *Sega Revamps, Primes Market for Webplay*, BRANDWEEK, May 1, 2000, available at http://www.findarticles.com/cf_dls/m0BDW/18_41/62001182/p1/article.html (last visited July 4, 2004). In a classic “installed base” model, Gillette marketed a shaving razor product whose base, the razor’s handle, was a “give away” while the components, razor blades, were sold at a profit. A proprietary locking feature in the base (handle) and components (blades) ensured that competitors could not create components that work with the base. However, the manufacturer of the base can then license others to make the complementary component.

⁴² *Id.*

⁴³ Richard Brest et al, *Space Invaders: How Video Game Makers are Plotting to Take Over Your Living Room 6*, available at <http://www.ranjaygulati.com/new/research/SPACE.pdf> (last visited July 4, 2004). Any loss in sales as a result of emulation impacts all participants in the value chain.

⁴⁴ *Id.*

¶21 Nintendo had realized approximately half of the total US\$5.6 billion in software sales for the N64 prior to UltraHLE's introduction.⁴⁵ Given that game console sales typically slow in the fourth year of a video game system's lifecycle due to market saturation and anticipation of the release of a next generation product, there are no data to prove the extent to which UltraHLE cannibalized the N64 market. Regardless, Nintendo deemed the threat significant enough to pursue legal action.⁴⁶ Following a letter from Nintendo threatening legal action, MegaMan announced it would no longer support UltraHLE or develop emulators.⁴⁷

III. EMULATION PERSPECTIVES

¶22 Console manufacturers claim that emulation is outright theft, whereas the emulation community considers it a programming feat to be admired.⁴⁸ At the center of this controversy is a struggle between fair use and monopoly rights. The following section explores both groups' perspectives.

Emulation is good	Emulation is bad
<ul style="list-style-type: none"> • Promotes nostalgia and backward compatibility • Provides an enhanced gaming environment • Does not infringe on intellectual property due to reverse engineering and fair use doctrines 	<ul style="list-style-type: none"> • Represents a huge financial threat • Compromises integrity of gaming experience and brand equity (trademark dilution) • Promotes copyright, trademark, and trade dress infringement

Figure 6: Typical Arguments For and Against Emulation

A. *Impetus for Emulation: User Community's Perspective*

¶23 The emulation community claims that emulation provides access to old popular games, enhances the gaming experience, and does not infringe game makers' intellectual property rights, since it principally allows gamers to play older video games no longer available in stores and possibly owned in now-outdated formats by the users.⁴⁹ As such, the emulator industry is a legitimate enterprise developed in response to latent customer demand that has gone unmet by console and video game manufacturers.

1. Emulation Provides Backward Compatibility and Facilitates the Preservation of Old Games

¶24 A key factor driving the emulation industry is consumer demand for backward and cross-system compatibility.⁵⁰ To drive profits, most console makers operate on a model

⁴⁵ See *supra* Figure 5: Nintendo 64 Software Game Revenues.

⁴⁶ See Pettus, *supra* note 21.

⁴⁷ *Id.*

⁴⁸ See Wen, *supra* note 2.

⁴⁹ Howard Wen, *New Life for Old Gamers*, SALON, June 1998, at <http://archive.salon.com/21st/feature/1998/06/23feature.html> (last visited July 4, 2004).

⁵⁰ Andrew Wolan, *Console Emulation & Its Impact* (1999), at <http://www.emulationzone.org> (last visited July 4, 2004).

of planned obsolescence in which they introduce a new system every five years.⁵¹ This effectively renders the previous system and its associated games obsolete. Since each successive system plays games designed uniquely for it, there is limited backward compatibility, and no ability to upgrade the older system to run the newer games.⁵² Thus, each time a new console generation is launched, consumers who wish to play the new games must purchase new hardware. Emulation, however, addresses this problem by allowing users to play both new and old games associated with their video game system, as well as those games developed for competing video game systems. Emulators thus provide the gamer with a degree of flexibility unmatched by the console manufacturers, since they provide the ability to access every game ever made for any system for free. Absent a suitable commercial channel to purchase the older games, they are available for free on peer-to-peer networks.⁵³

2. Emulation Enhances the Product Experience

¶25 Emulation supporters believe that emulation enhances the product experience by allowing the user to interact with the product in ways not conceived by the vendor.⁵⁴ For example, emulators often add features absent in the real console, such as the ability to “fast forward” the game or save the state of the game so that it can be resumed in midstream. Emulators also enable translation of games into foreign languages.⁵⁵

3. Emulation as Infringement on Intellectual Property Rights

¶26 Fans of classic games argue that emulation preserves video arcade games, many of which would otherwise be approaching extinction.⁵⁶ The preservation argument, however, is relatively weak, since only copyright holders can determine whether they wish their software to be archived. Even copyrights of games produced by companies that have gone out of business retain their value for the length of the statutory period.⁵⁷ As to the question of whether or not emulators infringe on intellectual property, the legal aspects remain murky.⁵⁸

⁵¹ See generally DEAN TAKAHASHI, *OPENING THE XBOX* (2002).

⁵² *Id.*

⁵³ For an example of a peer-to-peer network, see Kazaa, at <http://www.kazaa.com> (last visited July 4, 2004).

⁵⁴ Interview by Joe Glass with Sean Kauppinen, Communications Director of Bleem! Inc., Pcrave.com, May 5, 2000, at <http://www.pcrave.com/articles/85.htm> (last visited July 4, 2004).

⁵⁵ *Id.*

⁵⁶ *Id.*

⁵⁷ U.S. copyright laws state that copyrights on works for hire owned by corporations are valid for ninety-five years from the date of first publication. U.S. Copyright Office, *Duration of Copyright: Provisions of the Law Dealing with the Length of Copyright Protection*, Circular 15A (2000), available at <http://www.copyright.gov/circs/circ15a.html> (last visited July 4, 2004). Because video and computer games have existed for less than three decades, the copyrights of all video and computer programs will not expire for many decades to come.

⁵⁸ See Wen, *supra* note 2.

B. *In Defense of Corporate Assets: Game Makers' Perspective*

¶27 Game companies claim that users of emulators commit piracy and violate their copyrights because they are unauthorized users of code derived from the proprietary software present in game cartridges and consoles.⁵⁹ They also claim that emulators tarnish the game companies' brand equity, since emulators can never provide a gaming experience that equals "the real thing."⁶⁰ Both of these factors rob game makers of their fair share of profits. Game and console manufacturers present several arguments with regard to emulation.

1. "Emulation is piracy."

¶28 Game makers claim that emulators should be banned because they provide a vehicle for software piracy.⁶¹ While game consoles include built-in anti-piracy chips to prevent pirated software from being played, emulators do not have any anti-piracy mechanisms.⁶² Consequently, piracy hurts all members of the current value chain. Nintendo spokeswoman Beth Llewelyn best summarized the game makers' stance when she commented that "emulators are illegal, and they continue to support counterfeiting and piracy . . . this infringes on our intellectual property rights, and that's something we actively protect."⁶³

2. "Emulation is a threat to profits."

¶29 In addition to the popularly heralded arguments about piracy, emulation poses an economic threat. Emulation challenges game makers' core business model of forced migration to the next generation console while simultaneously denying the same companies' software/game revenue. As described earlier, console manufacturers operate a "razor/razor blade" business model that is threatened by the distribution of free ROMs that, in turn, cannibalize software (game) sales.⁶⁴ As a Nintendo legal department spokesperson has stated, the loss of a recurring software revenue stream is seen as the most significant threat:

The introduction of PC emulators created to play illegally copied Nintendo software represents the greatest threat to date to the intellectual property rights of video game developers . . . Such emulators have the potential to significantly damage a worldwide entertainment software industry, which

⁵⁹ See Ted Levan et al., *Emulation: The Anti-Emulation Position*, at <http://www-cse.stanford.edu/class/cs201/projects-98-99/copyright-infringement/emulationanti.html> (last visited July 4, 2004). See also Nintendo, *Legal Information*, available at <http://www.nintendo.com/corp/legal.jsp#emulator> (last visited July 4, 2004).

⁶⁰ Sam Costello, *Give me Liberty: Gameboy Emulator runs on Palm OS*, Cnn.com, July 11, 2000, at <http://www.cnn.com/2000/TECH/computing/07/11/liberty.games.idg/> (last visited July 4, 2004).

⁶¹ See Entertainment Software Ass'n, at <http://www.theesa.com/piracy.html> (last visited July 4, 2004).

⁶² See Levan et al, *supra* note 59.

⁶³ *Id.*

⁶⁴ See *supra* note 41 and accompanying discussion.

generates over fifteen billion dollars annually, and tens of thousands of jobs.⁶⁵

3. “Emulation leads to trademark/brand dilution.”

¶30 Console manufacturers such as Sony believe that emulators dilute trademark equity by distorting the product experience.⁶⁶ In its legal battle against Connectix, Sony alleged that “[Connectix’s Virtual Game Station (“VGS”)] attempts to imitate PlayStation gaming, but more than seventeen million consumers can attest to the fact that nothing technically can compare to the experience delivered through the PlayStation game console in tandem with a home television set.”⁶⁷ In other words, since VGS is not a real PlayStation, it cannot provide the “full” PlayStation experience (which presumably entails playing PlayStation games on a real television while using Sony joysticks for control, as opposed to playing them on a computer monitor while using a keyboard for control).⁶⁸ This dilutes the PlayStation trademark, which associates the PlayStation name with the “full” PlayStation experience, and counteracts the time and resources Sony devoted to building its unique gaming experience.

¶31 Nintendo executives likewise expressed concern that emulators contribute to brand dilution:

Distribution of an emulator trades off of Nintendo’s good will and the millions of dollars invested in research and development and marketing by Nintendo and its licensees. Substantial damages are caused to Nintendo and its licenses. It is irrelevant whether or not someone profits from the distribution of an emulator. The emulator promotes the play of illegal ROMs, not authentic games. It has the opposite effect and purpose . . . If these vintage titles are available far and wide, [then] it undermines the value of this intellectual property and adversely affects the right owner.⁶⁹

4. “Emulation leads to intellectual property infringement.”

¶32 The Entertainment Software Association (“ESA”), formerly the Interactive Digital Software Association (“IDSA”), an association that represents U.S. computer software and video game publishers, asserts that emulators infringe the intellectual property rights of the various game console and software vendors: “[I]n fact, most emulators that are freely available today are merely software[-based] emulators that have no role in the creation of properly licensed video games; these emulators have the exclusive purpose of infringing copyrights and are [therefore] illegal.”⁷⁰

⁶⁵ See Nintendo Online, at <http://www.nintendo.com/home> (last visited July 4, 2004).

⁶⁶ Ted Levan et al., *Do We Shoot the Messenger? What to do with Technologies that Indirectly Encourage Copyright Infringement* (March 1999), available at <http://cse.stanford.edu/class/cs201/projects-98-99/copyright-infringement/emulationanti.html> (last visited July 4, 2004).

⁶⁷ *Id.*

⁶⁸ *Id.*

⁶⁹ See Pettus, *supra* note 21.

⁷⁰ See Entertainment Software Ass’n Online, at <http://www.theesa.com/piracy.html> (last visited July 4, 2004).

¶33 While it may be true that some game makers' intellectual property rights are being violated (mostly in the form of copyright, trademark and trade dress infringement), the ESA's sweeping statement, like most generalizations, will not withstand the scrutiny of legal proceedings. To date, such matters have been decided on a case-by-case basis. Provisions for "fair use" and "reverse engineering"⁷¹ have rendered some emulators legal, and copyright infringement remains a gray area as the courts struggle with how to distinguish pirated from reverse-engineered emulators.⁷²

C. *Legalities of Emulation*

¶34 On March 22, 1998, the IDSA (now the ESA) launched the "great sweep" against the emulation community, shutting down emulation sites deemed to be pirating game software.⁷³ However, emulation is different from software piracy in that it is not inherently illegal; the specific combination and use of its individual components determines an emulator's legality.⁷⁴ In both *Sony v. Connectix* and *Sony v. Bleem LLC*, the Ninth Circuit Court ruled in favor of the emulators arguing that the fair use provision protected Connectix's reverse engineering of the PlayStation BIOS and Bleem!'s use of copyrighted images from PlayStation games.⁷⁵ Figure 7 below highlights the distinctions entailed in determining the legality of emulators.

¶35

Component	Legal	Illegal	Gray Area
Emulators	Reverse engineered emulators (protected under "fair use" doctrine) Making a copy of the software for development purposes (e.g., BIOS dump)	Reverse engineered emulators that incorporate actual code from the original console BIOS	? Using an emulator with legally owned software (in another media format)
ROMs/BIOS	Downloading & using public domain ROMs	Downloading & using "active" ROMs ⁷⁶	? Making a backup copy of the game

Figure 7: *Legal and Illegal Emulation Practices*

D. *Emulators*

¶36 Most emulators are built on the principle of reverse engineering.⁷⁷ Reverse engineering entails mimicking the behavior of an existing code base without directly

⁷¹ See *Connectix*, 203 F.3d at 596; *Bleem LLC*, 214 F.3d at 1022.

⁷² See Pettus, *supra* note 21.

⁷³ *Id.*

⁷⁴ Richard Lawrence, *The Legalities of Emulation*, available at <http://www.cris.com/~Twist/atari800win/legal.shtml> (last visited July 4, 2004).

⁷⁵ See *Connectix*, 203 F.3d at 596; *Bleem LLC*, 214 F.3d at 1022.

⁷⁶ "Active" ROM refers to those from contemporary commercially available software games.

⁷⁷ See Lawrence, *supra* note 74.

copying it.⁷⁸ Sometimes in the process of reverse engineering, code on the original platform is decompiled or disassembled into an intermediate form so its behavior can be determined.⁷⁹ The disassembly or decompilation of code for such study could be interpreted as creating a derivative work, which is illegal activity under copyright law. To prevent legal challenges to reverse engineering, it is generally carried out by two different people under a “clean room” technique: one person writes the specification and the other later codes the result, so that the coder has not seen the original code.⁸⁰ In *Sega Enterprises v. Accolade*, the Ninth Circuit Court of Appeals decided that disassembly falls under the fair use provision, stating:

We conclude that where disassembly is the only way to gain access to the ideas and functional elements embodied in a copyrighted computer program and where there is a legitimate reason for seeking such access, disassembly is a fair use of the copyrighted work, as a matter of law.⁸¹

¶37 The Digital Millennium Copyright Act (“DMCA”) of 1998⁸² codified the Ninth Circuit *Sega* ruling by granting reverse engineered products an exemption from copyright infringement claims as long as firms met the following conditions:

§ 1201(f). Reverse engineering. This exception permits circumvention, and the development of technological means for such circumvention, by a person who has lawfully obtained a right to use a copy of a computer program for the sole purpose of identifying and analyzing elements of the

⁷⁸ *Id.*

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ *Sega Enters. v. Accolade, Inc.*, 977 F.2d 1510 (9th Cir. 1992) (holding that the reverse engineering of a product, including the disassembly of the original code to understand functionality, was permissible, even if done for eventual third-party commercial use). *Sega* is commonly cited as upholding the legality of reverse engineering.

Accolade, a noted developer of videogame software, had produced six unlicensed games for the Sega Genesis home videogame console. Sega promptly sued Accolade, claiming copyright and trademark violation. The courts upheld Sega's contentions, but the decision was later partially reversed upon appeal. The Ninth Circuit Federal Court found that it was “fair use” for Accolade to dump and decompile the internal codes of the Sega Genesis and its games for developmental purposes, provided there was no other way to gain access to the concepts involved in their operation. This would have permitted Sega to establish a de facto monopoly over games for the console, which would have been unfair to Accolade. However, it was also ruled illegal for Accolade to activate the Sega Trademark Security System (TMSS) within these unlicensed games, however unintentional that may have been, since this gave the wrong impression that Sega had authorized Accolade's unlicensed titles when in fact they had not. Sega and Accolade eventually settled their differences out of court.

Sega is the case most frequently cited regarding the legality of reverse engineering. This is the case upon which the reverse engineering clause of U.S. copyright law is based (US 17 CR 1201(f)). It introduced the legal concept of the “intermediate copy”—a copy of copyrighted computer code generated from an original vendor product in order to develop a non-infringing product. It does not matter how the intermediate copy is produced so long as it is made, but it is significant to note that this dispute involved the dumping and disassembly of object code originally stored in ROM.

⁸² See U.S. Copyright Office § 107 (1-4) (2004), *available at* <http://www.copyright.gov/title17/92chap1.html#107> (last visited July 4, 2004).

program necessary to achieve interoperability with other programs, to the extent that such acts are permitted under copyright law.⁸³

¶38 In *Connectix* and *Bleem, LLC*, the defendants were able to successfully prove the use of “clean room” techniques during the development of its Sony PlayStation emulator, with the result that their product did not contain any infringing code, as outlined by the stipulations of the DMCA.⁸⁴

E. Emulation Software

¶39 Concomitant with debates regarding the legality of the emulators are those that question the legality of emulation software. Emulation opponents contend that the only software individuals can legally use is that which has either been purchased from the manufacturer or has been transferred by the manufacturer to the public domain.⁸⁵ Video game and console manufacturers insist that free distribution of their videogame software violates the games’ status as active commercial ROMs.⁸⁶

¶40 A more tricky issue emerges if the individual downloading the software actually owned the software in another form at one point. In this case, the emulator user may be able to legally use downloaded ROMs (since he now owns the original and an archival backup) under the “fair use doctrine.”⁸⁷ However, there are no hard-and-fast rules that dictate that certain uses are always fair; fair use has always been determined on a case-by-case basis.⁸⁸ To decide whether a particular use is fair use, the Copyright Act requires a court to consider four factors:⁸⁹

- (10) The purpose and character of the use;
- (11) The nature of the copyrighted work;
- (12) The amount and substantiality of the portion copied; and
- (13) The effect of the use on the market.

¶41 Often these rulings do not provide clear-cut guidelines. For example, in *Sony v. Universal Studios*, the Supreme Court ruled that private copying of over-the-air television broadcasts for the purpose of “time-shifting” (watching a television program at a time

⁸³ *Id.*

⁸⁴ See *Connectix*, 203 F.3d at 596 (holding development and release of an emulator is non-infringing provided that no patents were violated and that the final product did not contain any infringing code, also holding that emulation itself is a protected fair use of computer software). See also *Bleem*, 214 F.3d at 1022 (holding that Bleem!’s use of copyrighted images from PlayStation games was protected by “Fair Use”). Although Bleem! won the lawsuit, it was ultimately acquired and shut down by Sony as a result of the lack of success of its Bleemcast product and the financial drain of the lawsuit.

⁸⁵ Entertainment Software Association, *Anti-Piracy Information*, available at <http://www.theesa.com/piracy.html> (last visited July 4, 2004).

⁸⁶ *Id.*

⁸⁷ “Fair use” allows limited uses of copyrighted materials in ways that would otherwise be an infringement of copyright, even if the use was made without permission of the copyright owner. Originally created by the courts, the fair use doctrine was codified in the 1976 Copyright Act.

⁸⁸ See generally Mark Traphagen & Sarah K. Wiant, *Use of Copyrighted Computer Programs (Software) In Libraries—Scenarios*, (Sept. 6, 1996), available at <http://www.utsystem.edu/ogc/intellectualproperty/swguid.htm> (last visited July 4, 2004).

⁸⁹ 17 U.S.C. § 107, available at <http://www.copyright.gov/title17/92chap1.html#107> (last visited July 4, 2004).

other than its original network broadcast) was fair use, but did not apply the same rule to private taping of pay-television broadcasts.⁹⁰ Likewise, despite a provision adopted in 1992 regarding the permissibility of non-commercial home recording of music on cassette decks and the like, U.S. copyright law has never provided that private or personal copying is automatically fair use, and no court has ever so held.⁹¹

¶42 A similar case-specific response has emerged in the so-called “space-shifting” or “platform-shifting” phenomenon—e.g., copying a videogame so that it can be played on a different platform than that originally intended by the copyright owner.⁹² In fact, such copying, if not authorized, may be infringing.⁹³ In principal, only the publisher can decide when and whether to publish a videogame on a different platform; no court has recognized the right of the user to make such a decision under the fair use provision. In this instance too, fair use applies only after considering all four statutory factors. This includes the impact of the unauthorized platform-shifting on the copyright owner’s potential markets, including the market for the same game on a new platform, should the copyright owner choose to pursue it.

¶43 As these examples demonstrate, there are several critical aspects of emulation that fall within the gray-area of the fair use doctrine and copyright law in general. Until these issues are resolved, game makers will continue to argue that ROMs constitute a different media format and hence, are counterfeit and illegal.⁹⁴

IV. STRATEGIC OPTIONS FOR MEETING THE CHALLENGE OF EMULATION

¶44 The video game emulation market is still comprised primarily of early adopters, but with increases in both P2P file-sharing and broadband adoption this market is poised for growth.⁹⁵ As such, a reprise of the controversy in the music industry surrounding MP3 file-sharing may be imminent. Like their counterparts in the recording industry, console manufacturers have too much to lose if emulation fuels software piracy. To date, the console manufacturers have taken an approach similar to that of the RIAA by attempting to stifle the emulation community by litigating aggressively to protect their intellectual property rights. However, the courts have yet to rule in the game makers’ favor, as demonstrated by *Bleem, LLC* and *Connectix*⁹⁶. While the game makers and the ESA continue to crack down on emulation sites, the rampant transfer of ROMs will continue—for every ROM site that is shut down, others appear to meet the unmet demand.⁹⁷

⁹⁰ See *Sony Corp of Am. v. Universal City Studios, Inc.*, 464 U.S. at 429.

⁹¹ The authors are not aware of any court that has held that this is fair use. Such a ruling would be very controversial.

⁹² This is analogous to *RIAA v. Diamond*, 180 F.3d at 1081, where the court held that the cross-platform formatting of a music file is not infringement.

⁹³ In contrast, in *RIAA*, cross-platform formatting of audio media was not considered copyright infringement. *Id.* at 1081. However, as discussed earlier, this does not automatically imply that dumping a ROM and using it with a legal emulator is legal provided that its source is of legitimate origin and such actions are strictly limited to personal use.

⁹⁴ See Entertainment Software Ass’n (“ESA”), at <http://www.theesa.com/piracy.html> (last visited July 4, 2004).

⁹⁵ See GEOFFREY MOORE, *CROSSING THE CHASM: MARKETING AND SELLING HIGH-TECH PRODUCTS TO MAINSTREAM CUSTOMERS*, REVISED EDITION (1999) (defining an “early adopter” as a customer who embraces a new product concept early in its lifecycle.)

⁹⁶ See *Connectix Corp.*, 203 F.3d at 601; *Bleem, LLC*, 214 F.3d at 1030.

⁹⁷ See Figure 5: Nintendo 64 Software Game Revenues.

¶45 Given the reality that the Internet and peer-to-peer networks are here to stay, we recommend that console manufacturers/game makers avoid the posture of the music and motion picture industries by embracing emulation. We recommend a three-pronged strategy that entails: embracing and monetizing emulation by developing emulators for discontinued consoles, expanding game availability by supporting backward compatibility, and protecting intellectual property by expanding the IP portfolio.

A. *Embrace and Monetize Emulation*

¶46 “Clearly there is a market for commercial emulation software,” stated Marc Saltzman, *C/NET GameCenter* columnist and author of the C.A.G.E. arcade emulator.⁹⁸ Emulators are pervasive and consumers were willing to pay for them; sales figures for both commercial emulators for the Sony PlayStation, Connectix and Bleem!, far exceeded initial projections. Bleem! reported over fifty thousand units sold in the first month, and Connectix reported over one million dollars in VGS sales every week for its first three weeks on the market.⁹⁹ Instead of viewing all forms of emulation as a threat that must be dealt with legally, console manufacturers should adopt emulation and “share dreams rather than fight zero sum games.”¹⁰⁰

1. Develop Emulators for Discontinued Consoles

¶47 Console manufacturers must assess their portfolio of corporate assets and prioritize them by revenue, profits, and popularity. The consoles that still generate significant rents should be protected from unauthorized emulation by protecting all related intellectual property, while console manufacturers ought to emulate older systems that generate virtually zero revenue from game sales.¹⁰¹ Proactively creating and marketing best of breed emulators for the older systems would allow console manufacturers to win back customers from the emulation community. Moreover, it would also enhance the console manufacturer’s brand equity and recapture customer loyalty by demonstrating responsiveness to customer demand. Console manufacturers that produce their own emulators will have a major advantage over any emulator developer because they can “dump” their BIOS without any legal consequences. Consumers are also likely to flock to such an emulator which will be best of breed, legal, priced competitively, and made by the original console manufacturer—a trusted source of quality.

2. Monetize Older Games

¶48 By adopting emulation, console and game makers have an opportunity to generate additional, previously unrealized revenue and regain a modicum of control over their software’s fate. They could for example, make it available in a “walled garden” online

⁹⁸ See Pettus, *supra* note 21.

⁹⁹ *Id.*

¹⁰⁰ Hank Barry, Address at the Kellogg Digital Frontiers Conference (Jan. 18, 2003).

¹⁰¹ Each console manufacturer has a slew of consoles that have been discontinued and no longer generate profits. For example, the Nintendo Entertainment Systems (NES) and the Super Nintendo (SNES) generate zero revenues for Nintendo as all games have been discontinued and are only available via secondary markets such as eBay. Furthermore, the Nintendo 64 is at the end of its console lifecycle with only one percent of overall sales generated in 2002.

game playing arena on a pay-per-view or subscription basis. Consumers would then gain access to a complete game collection for a particular console in an integrated setting. As the online emulator would represent zero variable cost to the console manufacturers, they could use this “walled garden” as a communications channel with their consumers. As such it would serve as a forum to conduct market research as well as to promote the latest console system and its associated video games.

B. *Expand Game Availability*

¶49 Currently there is a huge gap between the commercial availability of games and actual consumer purchases.¹⁰² As the statistics in Figure 8 show, most console owners purchase a small fraction of commercially available games.

Console	Games Per Console	Total Games Available	Game Penetration
PlayStation	10.4	1,275	0.8%
Nintendo 64	7.5	290	2.6%
PlayStation2	6.1	457	1.3%
Nintendo Game Cube	4.6	168	2.7%

Figure 8: *Game Penetration*¹⁰³

¶50 Limited retail shelf space (typically reserved for the top selling video games) coupled with consumers’ willingness to purchase only a small fraction of the available games, should encourage console manufacturers to explore other avenues in order to preserve customer loyalty and maximize their revenue stream.

1. Support Backward Compatibility

¶51 Console manufacturers should ensure that each successive generation of game consoles offers backward compatibility via emulation, thus maximizing the longevity of the consumers’ software library and eliminating the risk of hardware obsolescence. As of March 2003, Sony was the only gaming console manufacturer to embrace this concept, making the Sony PS2 backward compatible with the PlayStation.¹⁰⁴ This allows consumers to still enjoy their PlayStation games without the inconvenience of maintaining two consoles. By meeting customer demand for backward compatibility, Sony deters game players from using emulators to play games designed for the older console.

¹⁰² See Figure 8: Game Penetration.

¹⁰³ “Games per console” equals the average number of games an average user owns on a particular platform; “total games available” equals the number of titles available for a particular platform; “game penetration” equals the games per console/total games available. See Press Release, The NPD Group, Annual U.S. Video Game Sales—The NPD Group Reports on Video Game Sales and Best Selling Video Game Titles (Jan. 27, 2003), available at http://retailindustry.about.com/library/bl/03q1/bl_npd012703.htm (last visited July 4, 2004).

¹⁰⁴ Since then Sony has announced that the PS3 will likely be backward compatible with the PS2 and PSX. See Curmudgeon Gamer, *Backward Compatibility for NextGen Consoles* (March 24, 2004), at <http://curmudgeongamer.com/article.php?story=20040322202148324> (last visited July 4, 2004).

2. Improved Customer Service

¶52 Console manufacturers should also improve service and maintenance for purchased games by replacing broken CD-ROMs and cartridges at no cost. Better service and maintenance agreements would diminish consumers' justification for ROM downloads.

3. Explore Alternative Business Models

¶53 The most substantial opportunity for game makers lies in locking up a recurring revenue stream via a subscription model. Currently, consumers buy few game titles, fearing that they may have to keep a game they do not enjoy. At thirty-nine dollars a title, this represents a significant level of "buyers' remorse." Game makers can help alleviate this concern by offering games on a rental basis. They should also provide consumers the option to purchase the game should they enjoy it, and wish to add it to their personal library.

¶54 Console manufacturers can facilitate this new business model in two ways: by marketing games directly to consumers by embracing the Blockbuster/Netflix.com model,¹⁰⁵ and by providing online access to a proprietary emulation website.¹⁰⁶ By working with companies like Blockbuster, which could offer gamers unlimited rentals with no deadlines for a flat monthly fee,¹⁰⁷ video game manufacturers can reach a wider audience. Blockbuster and other video/game rental establishments provide a substantial distribution channel for game manufacturers and the manufactures could arrange to receive a small percentage cut. Moreover, by allowing people to sample games before making a thirty-nine dollar commitment to purchase, programs like Blockbuster's generate visibility for games, which, in turn, drives purchases.

¶55 A Netflix.com-like model for gaming software distribution would allow consumers to access all of the games available from manufacturers as well as discontinued titles for a monthly fee. The revenues could be shared among the game developers, publishers, and console manufacturers (and the retailers' share of rents could be equally divided among the aforementioned players). Such an outlet could also be used to drive game sales, as new games could be pre-released on a television channel to encourage consumer adoption. With this type of model there would be fewer incentives for paying customers to download discontinued game ROMs. Eventually, as broadband adoption expands, consumers will be able to test and play games on demand, decreasing the need to ship video games back and forth from a Netflix type entity.¹⁰⁸ A menu providing access to a library of video games on demand, similar to a "Movies On Demand" channel, would afford consumers an additional avenue to experience games and to drive revenue for the game makers.

¹⁰⁵ See Blockbuster, Inc., at <http://www.blockbuster.com>; (last visited July 4, 2004) Netflix, Inc., at <http://www.netflix.com> (last visited July 4, 2004).

¹⁰⁶ The authors are not aware of any console manufacturers that utilize this model.

¹⁰⁷ Under the Netflix model, customers may rent up to a fixed number of titles at one time, may keep them indefinitely and may cycle the titles they hold.

¹⁰⁸ According to Forrester Research, eighteen percent of American households will have connected gaming consoles ready to play games online by 2007. See Forrester Research, at <http://www.forrester.com> (last visited July 4, 2004). See also Appendix Exhibit 5: Consumer Broadband Adoption and Online Gaming.

¶56 Finally, game console manufacturers like Nintendo and Microsoft should take control of the entire emulation phenomenon by creating their own websites where emulators for older games can be accessed for a nominal fee. By satisfying market demand for access to older games, and backing this effort through judicious application of the companies’ intellectual property rights to shut down other emulators, Nintendo and Microsoft can satisfy market needs and stop the cycle that promotes unauthorized emulation.

C. Build and Protect Intellectual Property Rights

¶57 To date, console manufacturers have used only a very small portion of their available options to protect their intellectual property. Indeed, the majority of the legal cases have been brought on the basis of basic patent and copyright violations.¹⁰⁹ We contend that an approach that guarantees maximum intellectual property protection entails console manufacturers utilizing all of their product rights—patents, trademarks, and copyrights—simultaneously across their entire portfolio of gaming consoles and video games. A comprehensive strategy is necessary because of variations in the life and type of protection afforded by the different regimes of intellectual property.¹¹⁰ The variations are illustrated below:

Higher Functionality		Lower Functionality
Life of Protection		
Patents	Copyright	Trademark
Utility patent for the console BIOS	Secure copyrights for video games and relevant packaging	File Intent to use (ITU) thirty-six months prior to launch of video game and console moniker
Design Patent for the console’s Start-up Screen User Interface (UI)	Secure copyright protection for console packaging	File for monikers trademark protection in both typed drawing and stylized format
	Secure copyright for console BIOS	Secure digital trade dress protection for console’s start-up screen
	Secure copyright for the console’s start-up screen	Protect trademarks via commercial usage of them

Figure 9: Nature of Protection Provided by Patents, Copyrights, and Trademarks

¹⁰⁹ See *Bleem, LLC*, 214 F.3d at 1022.

¹¹⁰ James Conley & John Szobocsan, *Snow White Shows the Way*, *MANAGING INTELL. PROP.*, Jun. 2001, at 33.

1. Expand Intellectual Property Portfolio: Patent Protection Tactics

¶58 From a functional standpoint, patents provide console manufacturers with the most powerful intellectual property protection.¹¹¹ In particular, the BIOS utility patent offers video game and console manufacturers relatively strong protection against emulation created by a direct BIOS dump.¹¹² Since a patent claims functionality that extends beyond how the code is written, it is much harder to reverse-engineer around a patent than around a copyright. As such, console manufacturers should seek both copyright and patent protection; forcing competitors to reverse-engineer around a copyright and design around a patent creates a substantial competitive barrier to entry. Additionally, console manufacturers should also file for design patents to protect the user interface of the gaming console start-up screen and menu.¹¹³ Figure 10, below, is an example of a protectable interface.¹¹⁴ The combination of the utility and the design patents will maximize the protection potential of patents.

2. Copyright Protection Tactics

¶59 Gaming console manufacturers have traditionally focused on copyrighting video game titles for the various consoles.¹¹⁵ For example, Nintendo has 1500+ registered US copyrights pertaining to video games and their product packaging.¹¹⁶ Sony has relatively few.¹¹⁷ Likewise, console manufacturers should use copyright protection to protect the overall look and feel of the console start-up menu and start-up screen. This will protect the graphical monikers, icons, symbols, layout of menu-bars, shapes, and designs via copyright protection. Based on our research in March 2003, Microsoft is the only console manufacturer to have sought copyright protection for its console start-up menu.¹¹⁸

¹¹¹ *Id.* Function is the domain of invention in patent.

¹¹² *Id.*

¹¹³ John Kheit, *Understanding Patents & How They Apply to Apple*, THE MAC OBSERVER, Mar. 2003, available at <http://www.macobserver.com/editorial/2003/03/05.1.shtml> (last visited July 4, 2004).

¹¹⁴ Screen shot from XBOX start-up menu.

¹¹⁵ The authors performed a preliminary search of copyright registrations; see U.S. Copyright Office Online, Search Records, at <http://www.copyright.gov/records/> (last visited July 4, 2004).

¹¹⁶ Search terms include Nintendo, Gameboy and Game Cube.

¹¹⁷ Search terms include Sony, PlayStation, and video games.

¹¹⁸ See U.S. copyright registration VA-1-150-163, available at <http://www.copyright.gov/records/> (last visited July 4, 2004).



Figure 10: XBOX's Start-up Menu could be protected by patent, copyright and trade dress.

3. Trademark protection tactics

¶60 Filing an Intent to Use trademark application (“ITU”) should be done at the earliest possible moment (currently, thirty-six months prior to launch) to ensure that the video game console maintains the right to that trademark.¹¹⁹ Delay in filing an ITU trademark application can be costly, as Microsoft discovered when it tried to obtain the trademark for the XBOX: Microsoft could have filed for the trademark XBOX in December of 1998, thirty-six months prior to the XBOX’s November 2001 launch.¹²⁰ However, when Microsoft filed for the trademark in October 1999, it discovered that another company (Xbox Technologies) had already filed for the trademark in March of 1999.¹²¹ Since Microsoft had already spent five hundred million dollars marketing the XBOX, Microsoft decided to purchase the trademark from Xbox Technologies.¹²²

¶61 Console manufacturers should also file for digital trade dress protection for symbols that appear on the console start-up screen, start-up menu, and packaging. For instance, Nintendo would have been wise to copyright the three-dimensional “N-Cube” logo that is found on its packaging and on the N64 start-up screen. In general, console manufacturers have filed for trademark protection for the drawing version of the trademark. For example, Nintendo has trademarked NINTENDO 64. However, Nintendo has not filed for the stylized version as illustrated in Figure 11.¹²³ By filing for the stylized version Nintendo would strengthen the functionality of the protection preserving the firm’s right to litigate against emulator makers that use the trade dress.

¹¹⁹ See U.S. PATENT AND TRADEMARK OFFICE, TRADEMARK MANUAL OF EXAMINING PROCEDURE—APPLICATION REQUIREMENTS § 800 (3d. ed. 2002), available at http://www.uspto.gov/web/offices/tac/tmep/0800.htm#_T801 (last visited July 4, 2004).

¹²⁰ James Middleton, *Trademark Dispute May Delay Xbox Release*, IT WEEK, May 2, 2001, available at <http://www.vnunet.com/News/1117216> (last visited July 4, 2004).

¹²¹ *Id.*

¹²² *Id.*

¹²³ See U.S. Patent and Trademark Office Online, at <http://www.uspto.gov> (last visited July, 2004).

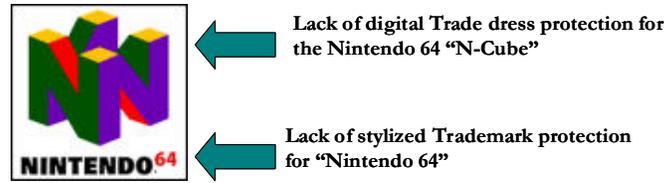


Figure 11: Unprotected Nintendo 64 Symbol

¶62 Finally, game makers must remain vigilant about supporting their trademarks after the hardware and software for old consoles have been retired. After five years of non-commercial usage, the trademark becomes available even if the USPTO status of the mark is “live”.¹²⁴ As of this writing, a trademark squatter filed a petition for cancellation against Hasbro since it has not used the trademark COLECOVISION (gaming console) for at least five years.¹²⁵ The potential ease with which a trademark cancellation can be achieved further bolsters the argument for why console manufactures should make emulators for their older console systems, since by developing and marketing an emulator for an old game console, a company can maintain its trademark. Figure 12 summarizes the legal strategies available to console manufacturers.

Acquire the best emulators	Enforce IP rights against emulators	Enforce IP rights against ROM distributors
Eliminate competitors with the best technology and largest user bases	Distract leading emulators with legal battle and drain financial resources	✓ Financially support organizations such as ESA to minimize ROM piracy
Build IP portfolio by copyrighting and patenting newly acquired software	Offer to drop litigation in exchange for concessions protecting console software revenue streams	✓ Litigate directly against ROM distributors (websites & P2P)

Figure 12: Legal Strategies for Protecting Assets

V. CONCLUSION: A THREE-PRONGED STRATEGY FOR MEETING THE CHALLENGE OF EMULATION

¶63 To date, video game console manufacturers have engaged in a legal offensive to shut down emulators. To succeed in meeting the challenge posed by emulation, the incumbent console manufacturers will need to protect and leverage their intellectual property in concert with an appropriate business strategy and marketing methods. Companies like Sony, Nintendo, and Microsoft skyrocketed to the top of this industry by identifying a market need and developing quality products to meet that defined need. To stay at the top, these companies must accept that the pace of technological change will always exceed the pace at which the law can respond. Business leadership, including attention to pricing and the satisfaction of customer demand, will be just as critical as

¹²⁴ See U.S. PATENT AND TRADEMARK OFFICE, TRADEMARK MANUAL OF EXAMINING PROCEDURE—APPLICATION REQUIREMENTS § 718 (3d. ed. 2002), available at http://www.uspto.gov/web/offices/tac/tmep/0800.htm#_T801 (last visited July 4, 2004).

¹²⁵ *Id.*

judicious application of the law in developing a workable solution to the challenges posed by emulation. Figure 13 summarizes our proposed strategic response to emulation.

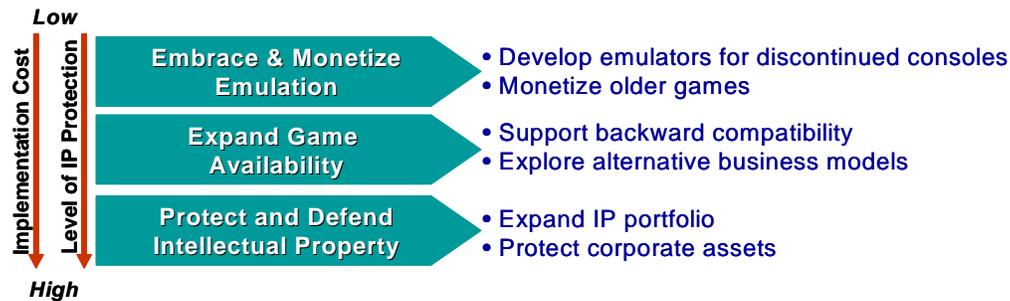


Figure 13: Proposed Strategic Response to Emulation

¶164 Our proposed strategy of acquiring the leading emulators serves a two-fold purpose of building intellectual property rights and protecting corporate assets from emulation. Console manufacturers should acquire best of breed emulators and use the acquired IP in their defense against other emulator developers (who often emulate source code from the leading emulators). Yet this action alone is not sufficient because it fails to address the customer demand that sustained the leading emulators. Rather than just litigating, console manufacturers should embrace emulation and launch their own best emulators for older console systems. By entering into the business of emulation themselves, console manufacturers simultaneously co-opt the emulation market and then eliminate it by responding to the latent customer demand for access to older games.

¶165 Embracing emulation provides console manufacturers an opportunity to seriously rethink their business models. Instead of supporting a traditional emulator, they may consider it more feasible to make all game software backward compatible and/or explore alternative business models, such as the Blockbuster/Netflix.com model, which allow customers to rent rather than purchase media entertainment. Console manufacturers must remain vigilant and carefully observe the market; the solution provided by embracing emulation will be short-lived if console manufacturers are not poised to respond proactively to the next trend. Finally, console manufacturers should use the full range of the available intellectual property protection to their advantage. As copyright is a relatively weak form of protection, when appropriate, they should seek to obtain patent and trade dress protection.

¶166 As this article has emphasized, a successful strategy for intellectual property management in the information goods industry entails the integration of the full range of intellectual property enforcement tactics with proactive business thinking. Absent such an approach, the players are left to the sales strategy of competing on price, a certain method for killing profit margins.¹²⁶

¹²⁶ L.J. Flynn, *Deep Price Cuts Help Nintendo Climb to Number 2 in Game Sales*, N.Y. TIMES, Jan. 26, 2004, at C2.

VI. APPENDIX: EXHIBITS

A. *Exhibit 1: Types of Emulation*

Type of Emulator	Characteristics	Example
Pure Software	Requires no additional hardware to operate	NES video game emulator that runs on a PC
Pure Hardware	Physical device requiring no additional software to operate	Adapter allowing cartridges designed for one console to operate on another
Hybrid	Requires both software and hardware components	PC Bridgeboard which allowed IBM PC software to run on an Amiga computer

B. *Exhibit 2a: Video Game Console Emulation Timeline*¹²⁷

Year	Event
1991	First software-based video game emulator developed to play Sega Genesis video games. Never released to the public. Developed 4 years after the Sega Genesis was released.
1992	AmIBM, first hoax Video Game emulator released to public.
1996	SNES9X, first Super Nintendo (SNES) video game console emulator released. The release was 5 years after the SNES was brought to market.
1997	PSEmu, first Sony PlayStation video game console emulator released. Developed 4 years after the Sony PlayStation was released.
1997	ZSNES, second Super Nintendo (SNES) video game console emulator released.
1997	ROM sites, where consumers can download game ROMs. Emulators start to appear on the Internet and gain popularity.
1998	Connectix releases first commercially vended Sony PlayStation emulator for the Mac, the Virtual Game Station (VGS).
1999	UltraHLE, the first Nintendo 64 emulator was released 4 years after the introduction of the Nintendo 64.
1999	Bleem! released as the first commercially vended for the PC.

C. *Exhibit 2b: Video Game Console Releases and Processing Power*¹²⁸

Console	Year of introduction	Bus Width (Bits)	Clock Speed (Mhz)	Processing Power (Flops)

¹²⁷ See Pettus, *supra* note 21, at Appendix C: Emulation Timeline.

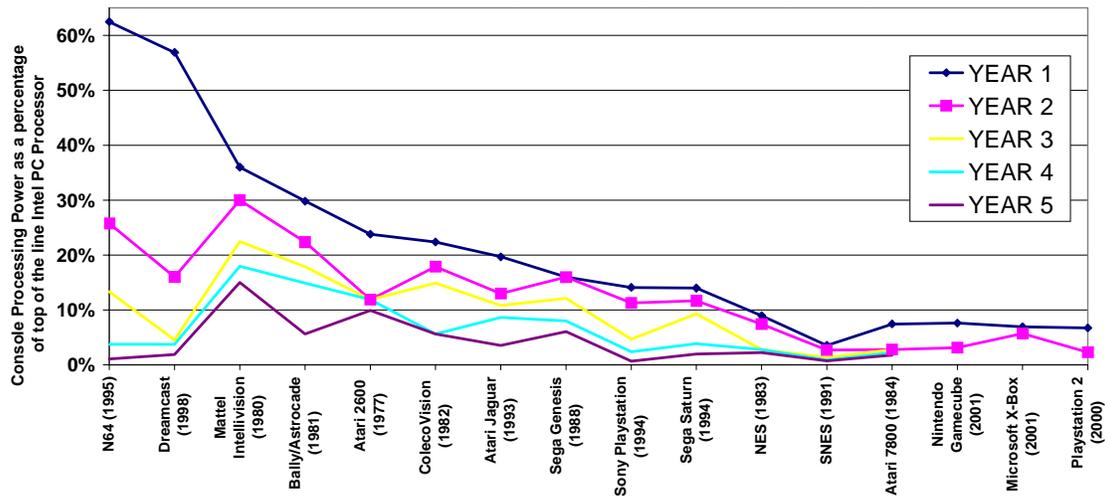
¹²⁸ See generally Liaw, *supra* note 31.

Atari 2600	1977	8	1	10
Mattel Intellivision	1980	8	4	29
Bally/Astrocade	1981	8	4	29
ColecoVision	1982	8	4	29
NES	1983	8	2	14
Atari 7800	1984	8	2	14
Sega Genesis/Megadrive	1988	16	8	128
SNES	1991	16	4	57
Atari Jaguar	1993	32	26	832
Sega Saturn	1994	32	28	896
Sony PlayStation (1994)	1995	32	34	1,084
N64	1996	64	94	6,000
Dreamcast	1998	128	200	25,600
PlayStation 2	2000	128	295	37,749
Nintendo Gamecube	2001	128	405	51,840
Microsoft X-Box (2001)	2001	128	733	93,824

D. Exhibit 3a: Processing Power Comparison: PC v. Game Console

¶67

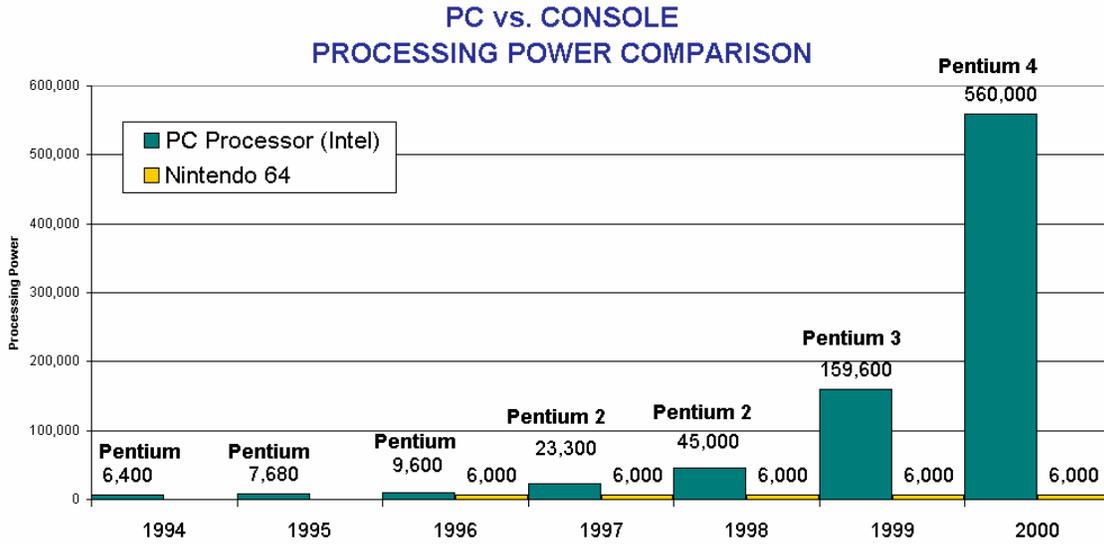
The following chart illustrates the processing power of gaming consoles relative to state of the art Intel based PC for the five year life cycle of the gaming console:



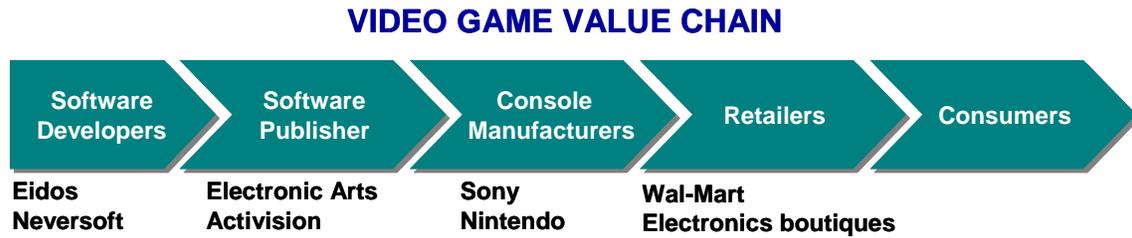
¶68

The chart demonstrates that, in the best case scenario, the processing power of the gaming console is sixty percent of that of the PC at the time of introduction (e.g., for Nintendo 64). It also shows how quickly the PC processing power surpasses that of the gaming console. By the fourth year of the game console’s useful life, the PC has five times the processing power.

E. Exhibit 3b: Processing Power Comparison: Intel v Nintendo 64



F. Exhibit 4: Video Game Industry Value Chain



1. Software Developers

¶69

This layer of the value chain is primarily responsible for the ideation and development of video games for consoles. Similar to the Hollywood model, small studios typically develop a game concept and then seek funding from a major producer called a software publisher. There are roughly one hundred independent studios that are contracted to produce “third party” titles, while wholly-owned subsidiaries of either a software publisher or console manufacturer produce “first party” titles. In most cases, first party software remains “exclusive” to a parent-company’s hardware platform of choice. Third party publishers have a greater incentive to translate or “port” video games to competing consoles.

2. Software Publishers

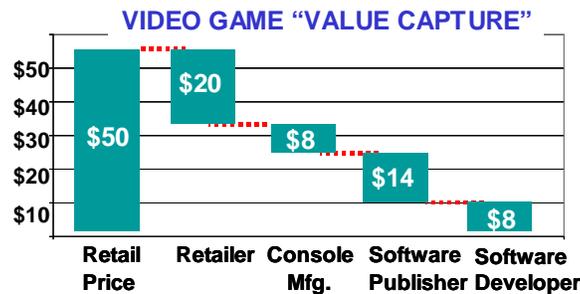
¶70

Twenty large publishing houses, such as Electronic Arts, exist in the second level of this value chain. These players are responsible for funding and distributing most major game titles. Software publishers bear the brunt of the project risks, as they must pay their software developers the full research and development cost regardless of how well the

game sells. Publisher responsibilities include: product funding, product testing (finding bugs), packaging development, user manual development, customer service, marketing, public relations, and retail distribution. Their goal is to maximize sales, and as a result they prefer to launch games across multiple game consoles in order to sell more units. Roughly 300,000 units must be sold in order to break even; not surprisingly, seventy five percent of published video games fail to break even. Blockbuster video games sell units in the 1 million plus range and are highly profitable. For example, Tony Hawk accounted for almost half of the second largest publisher's revenues in 2001.¹²⁹

3. Console Manufacturers

¶71 The three video game console manufacturers, Nintendo, Sony, and Microsoft, control the value chain, as developers and publishers do not have the right to produce titles for the manufacturer's console without the console manufacturer's consent. In addition, video game publishers are required to pay a licensing fee for each unit sold (the fee is typically 16 percent of revenue; see illustration below).¹³⁰



¶72 With only three players in this part of the value chain the revenue capture per player is higher than that of any other part of the chain. Console manufacturers embrace the razor and razor blade model as the consoles are sold below cost to increase the user base. Console manufacturers strive to sign exclusivity deals with "third party" video game publishers for a single title or their entire portfolio of titles. Console manufacturers also have in-house developers that strictly produce "first party" titles. First party title development allows console manufacturers to capture all the rents associated with development, distribution, and licensing.

4. Retailers

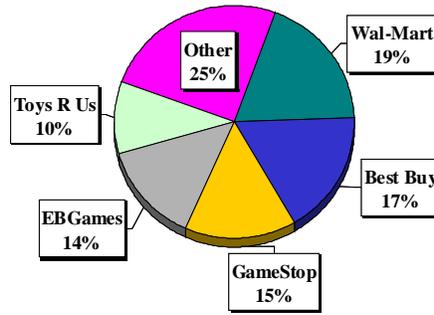
¶73 The top five brick-and-mortar retailers are responsible for seventy-five percent of video game sales.¹³¹ Retailers include software specialty stores such as GameStop and Electronics Boutique, toy stores such as Toy R' Us and KB Toys, larger electronic retailers such as Best Buy and Circuit City, and mass merchandisers such as Wal-Mart. Retailers capture forty percent of retail revenues:

¹²⁹ Telephone interview with Kevin Wynne, Marketing Manager, Activision, by David Perez, February 23, 2003.

¹³⁰ See Interview with Phillip Mehler, *supra* note 43.

¹³¹ See Press Release, The NPD Group, *supra* note 103.

Top 5 Video Game Retailers

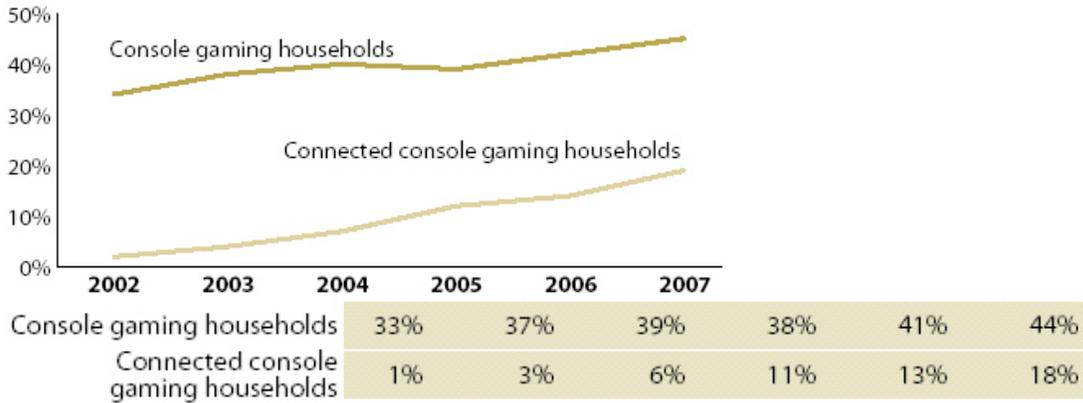


5. Consumers

¶74

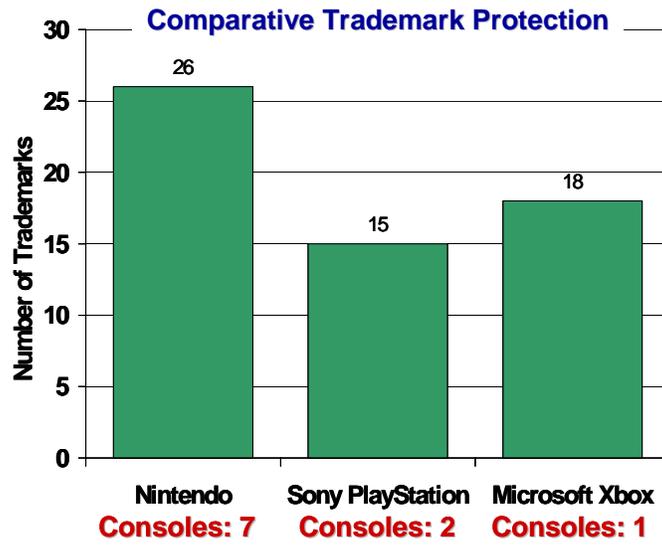
A virtuous cycle exists in that the more end-users there are on a given video game console, the more likely the software publishers are to publish titles for that platform. Similarly, the more titles there are on a platform, the more likely the end-user is to purchase and use that platform.

G. *Exhibit 5: Consumer Broadband Adoption and Online Gaming*¹³²



¹³² See Forrester Research, *Connectivity Splits the Gaming Industry*, February 2003, available at <http://www.forrester.com> (last visited July 4, 2004).

H. *Exhibit 6: Comparative Trademark Protection*¹³³



¹³³ Nintendo's three hand-held consoles (e.g., Game Boy Advanced) are included in this analysis. See U.S. Patent and Trademark Office Online, *available at* <http://www.uspto.gov> (last visited July 4, 2004).