EXHIBIT C

(MDY's SDF)

EXPERT WITNESS REPORT

Re: This report is being prepared in connection with the case of
<u>MDY Industries, LLC vs. Blizzard Entertainment, Inc. and Vivendi, SA</u>
Case No. CV 06-2555 PHX-DGC

Witness: Joseph A. Calandrino

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Nature of Testimony in General:

Mr. Calandrino will testify regarding his technical opinion of Blizzard's claims of contributory copyright infringement, vicarious copyright infringement, and violation of the Digital Millennium Copyright Act (DMCA) by MDY Industries. He will describe Glider's primary functionality and opine that Glider can be adapted to work with games other than World of Warcraft (WoW), whether those games are massively multiplayer online games or or not. He will opine that MDY's Glider software neither copies nor attempts to copy the WoW client software. He will further opine that Glider does not subvert Blizzard's various copy-protection mechanisms intended to control access to the WoW client software, Blizzard's servers, or the game environment, but instead allows authorized users to engage in activity that Blizzard considers to be cheating and in violation of those users' contractual obligations. In addition, he will opine that Blizzard's Warden program is not a copy-protection mechanism but a mechanism to assist in the detection of contractually prohibited behavior.

Opinion, Basis, and Reasoning:

Glider's Primary Functionality and Its Applicability to Other Game Software

Before delving into my main points, I will provide a brief description of my understanding of Glider's activities once a user is inside of the WoW game environment. Glider's primary functionality, which Blizzard apparently considers to be cheating, is to automate

certain in-game tasks for authorized WoW users. Based on my understanding of the Glider software from discussions with Mr. Donnelly and my review of Glider's functionality, Glider "acts" like a user by processing data that the game would typically display graphically for that user and simulating user actions. To do so, Glider examines WoW client data to build an internal model of the present status of the game. Glider is then able to take scripted actions based on that status by simulating users' keyboard and mouse input in the game.

Although I believe Glider may have been designed specifically for WoW, including an implementation that evades detection by Blizzard's anti-cheating mechanism (described later), the Glider software could be modified to allow similar activity in other games—and other software in general—regardless of their accompanying contracts. Many games, whether massively multiplayer online games or not, require repetitive tasks to achieve certain desirable goals. A modified version of the Glider software could serve as a general framework for performing such tasks that accepts two modules from users. The first module could interpret a game's data and help maintain a model of the game's state. The second module could assist Glider in transforming scripts of desirable activity based on game state into simulated combinations of user actions. For example, one module could help maintain a model of a specific solitaire game's status (e.g., the cards that a user would have seen, the amount of time elapsed, points scored, etc.), and another module could tell Glider how to move the mouse or press keys to take certain actions based on that status (e.g., how to move a card from one pile to another). By adapting Glider to utilize its botting features with other game software (including game software for single-user or offline games), Glider could be used to automate user tasks in many games other than WoW.

Alleged Copying of WoW Client Program

Paragraph 33 of Blizzard's counterclaims states that, "When the WoW client is launched, a copy of the program is loaded into the user's own computer's random access memory." The counterclaims repeatedly indicate that the act of launching the client program results in a new copy of the program. Within the technical community, the act of loading a program to random access memory is not thought to constitute a reproduction in a copyright sense. A bit of technical background may help clarify the reason for this. Note that, when referring to a computer, I am referring to a typical modern personal computer. In addition, I use the term data to refer to both traditional data (for example, a Microsoft Word document) and data representing program instructions.

Several types of memory exist in modern computer systems, and computer scientists conceptually arrange these types of memory as levels in a single hierarchical structure (see Figure 1—when discussing the memory hierarchy within a single modern personal computer, we are typically referring to registers, cache, main memory, and a certain type of magnetic disk inside that machine) (*see* J. L. Hennessy, D. A. Patterson. Computer Architecture: A Quantitative Approach, Third Edition. Morgan Kaufmann Publishers, p. 390-394. 2003.). Hennessy and Patterson describe this hierarchy:

> Since fast memory is expensive, a memory hierarchy is organized into several levels—each smaller, faster, and more expensive per byte [a unit of storage space] than the next lower level. The goal is to provide a memory system with cost almost as low as the cheapest level of memory and speed almost as fast as the fastest level. The levels of the hierarchy are usually subset one another. All data in one level are also found in the level below, and all data in that lower level are found in the one below it, and so on until we reach the bottom of the hierarchy.

(*See* J. L. Hennessy, D. A. Patterson. Computer Architecture: A Quantitative Approach, Third Edition. Morgan Kaufmann Publishers, p. 390. 2003.). To approach the speed of memory at the top of the hierarchy and match the storage space of memory at the bottom (at reasonable cost), modern computers contain multiple types of memory. As mentioned, while a computer is running, memory at one level of the hierarchy usually contains a subset of the data stored at lower levels. Complex procedures move data between memory types and ensure that faster memory contains the subset of data that the computer's processor will most likely need in the near future.

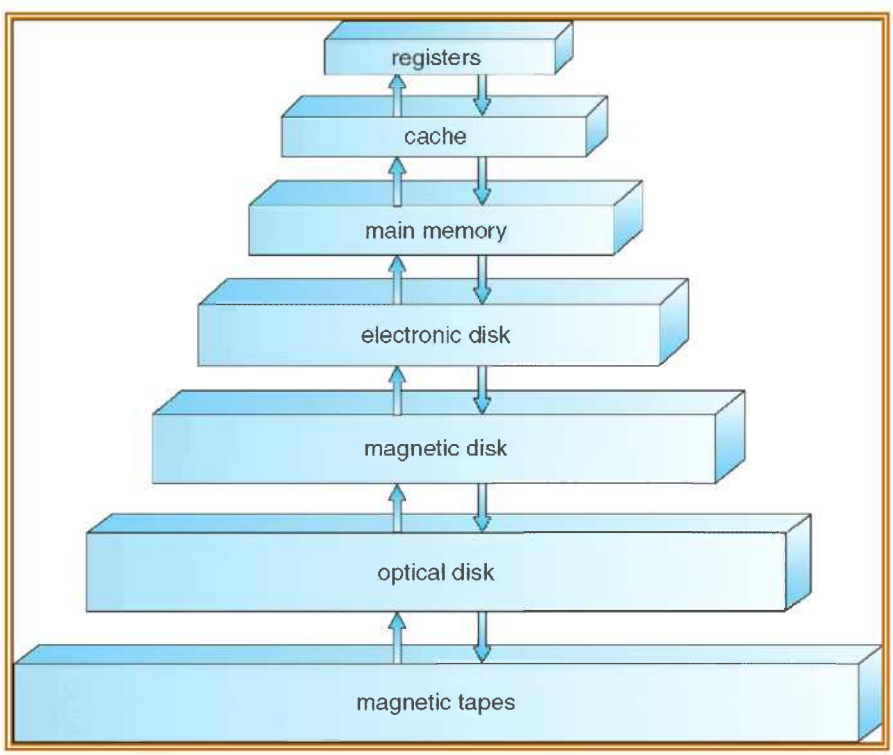

Figure 1. The computer memory hierarchy. Image from supplimentary slides for A. Silberschatz, G. Gagne, P. B. Galvin. Operating System Concepts, Seventh Edition. John Wiley & Sons, Inc. 2005. Equivalent image appears on p. 9 of textbook. Slides available at: http://codex.cs.yale.edu/avi/os-book/os7/slide-dir/ch1.ppt (accessed October 24, 2007)

In this hierarchy, random access memory (RAM—included in the "main memory" level in Figure 1) falls above the hard drive (included in the "magnetic disk" level in Figure 1). As RAM is too small to store all data that a modern computer might use—the WoW software alone is too large to fit entirely in available RAM on a typical computer—the hard drive serves as a

computer's primary data store. The hard drive is also useful because, unlike RAM or memory further up the hierarchy, it does not require power to continue storing data. Without a hard drive, data in a computer could be lost entirely when the computer is shut off (*see* A. Silberschatz, G. Gagne, P. B. Galvin. Operating System Concepts, Seventh Edition. John Wiley & Sons, Inc., p. 9. 2005.). The WoW client program is typically stored in a computer's hard drive when the program is not running. Although it would be a tremendously difficult and senseless exercise, one could design a computer that runs all programs, including the WoW client program, directly off of the hard drive without loading instructions to RAM.

When a program is run, some or all of its data is loaded to RAM and other forms of memory further up the hierarchy. The program is not copied to any medium to be physically removed from the computer, such as a CD or DVD, and the program is not sent via a network to any other computer. All data remains inside the single physical computer and the single memory hierarchy on which the game was installed. As explained earlier, this hierarchy is a performance improvement: one could technically design a computer that uses only a hard drive, but the resulting machine would be unbearably slow by today's standards. Therefore, to refer to the movement of data between various levels of this hierarchy as "copying" is misleading without further explanation. Legitimate installation of the WoW software on a computer results in a copy of the program being made into the computer's memory hierarchy, and the program remains within the memory hierarchy when launched. If a distinction between copying a program and loading a program to RAM is not made, Blizzard's own EULA would appear to prevent a user accepting the EULA from even running the software:

> Subject to the license granted hereunder, you may not, in whole or in part, copy, photocopy, reproduce, translate, reverse engineer, derive source code from, modify, disassemble, decompile, or create derivative works based on the Game… (*See World of Warcraft EULA, February 2, 2007*)

Simply stated, the movement of data between various levels of the hierarchy is part of the internal operations of the computer that allow a user that has legitimately installed the WoW client program to launch that program.

Blizzard essentially argues that one must treat the movement of data between various levels of the memory hierarchy as acts of creating new copies. It appears they further argue that if this is done while simultaneously violating a term in a EULA it constitutes a copyright violation. Levels of memory exist above RAM in the memory hierarchy: registers and cache. Registers allow so little storage that data constantly moves into and out of them. Thus, if a EULA requires that a user continuously hum a certain tune while they run a copyrighted program, a legitimate user that forgets to hum the tune for several moments could technically create thousands of unauthorized "copies" of program instructions and data during that brief span. In this example, no new copies are made, no copy-protection mechanisms are subverted, and the user may have installed the program legally to his or her computer.

By similar logic to that of the copyright counterclaims, Blizzard's own Warden program (discussed later) also could potentially create unauthorized copies of other programs. Researchers have claimed that Warden examines the code of other running programs to see whether that code matches certain suspicious patterns (*see* G. Hoglund, G. McGraw. Exploiting Online Games: Cheating Massively Distributed Systems. Addison-Wesley, pp. 49-53. 2007.).

Suppose that this claim is correct and that I distribute a program that performs no unauthorized activity and can run alongside WoW. Further, assume that my EULA stipulates that no unauthorized copies of the program can be made and that the software is only to be used for a certain specific purpose. For Warden to determine whether my program code contains certain patterns, this check would typically load portions of my program to higher levels of memory, such as cache and registers. Taking Blizzard's arguments to their logical conclusions, Warden would be creating unauthorized copies of my program if it performs such checks.

Blizzard's counterclaims indicate that Glider launches WoW "as a subservient process" (paragraph 55) and does not use "the authorized WoW launcher functionality" (paragraph 53). I have reviewed the Glider code in detail for launching WoW. The code uses a standard call (i.e., roughly the same call as if the user double-clicked on Blizzard's WoW program icon) to the underlying operating system for launching a program. Glider does launch WoW in a "suspended" state and resumes the WoW program's operations shortly thereafter. But, regular programs can suspend and resume each others' operations in the Microsoft Windows operating system. For example, the WoW client program could suspend and resume other processes if desired. In addition, certain versions of Glider may launch the WoW client program with "User" privileges while the Glider program runs with "Administrator" privileges. Intuitively, a program running with "Administrator" privileges is highly trusted and can take certain actions that a program running with "User" privileges cannot. The logic behind this is that certain tasks might require special actions that you would not want just any program to perform. Users, however, might normally choose to run the WoW client program with only "User" privileges for security reasons. In fact, Microsoft's Windows Vista operating system automatically runs the WoW client program with only "User" privileges regardless of whether Glider is even on the machine. Glider does launch WoW without Blizzard's launcher functionality, but Blizzard does not require users to utilize the provided launcher's functionality and even offers instructions for not using the launcher:

> …if you prefer to bypass the Blizzard Launcher and do without the benefits it provides, you can run World of Warcraft by double-clicking the WoW.exe file located in the World of Warcraft folder. (*See* http://www.worldofwarcraft.com/misc/launcher.html — Accessed October 24, 2007).

The reason that Glider launches WoW and does so in the manner described is to avoid detection by Blizzard's anti-cheating mechanisms (discussed later) and not for the purpose of copying the game. A user could certainly launch WoW in whatever manner he or she chooses and launch Glider afterwards, but WoW's anti-cheating mechanisms might detect Glider before Glider can hide. Regardless of the order of operations and the specifics of the launch process, Glider neither copies nor helps copy the client software to a removable medium (e.g., CD, DVD, etc.) or another computer. In summary, the act of loading a licensed copy of WoW from a user's hard drive into RAM does not constitute the creation of a copy, authorized or not. Furthermore, it is my opinion that Glider's launch process neither creates, nor was it designed to create, an unauthorized copy of the WoW client software.

Alleged Subversion of Copy-Protection Mechanisms

Blizzard also accuses MDY of subverting mechanisms intended to control access to the client software, server, and game environment. As I will describe shortly, Blizzard has several copy-protection mechanisms to control access to its copyrighted works, and Glider neither interferes with nor subverts these mechanisms. Instead, at worst, Glider allows authorized WoW users to access that work in a manner that Blizzard apparently considers to be in violation of its EULA and TOU. Blizzard's primary mechanism for detecting programs that enable cheating, Warden, is simply an anti-cheating mechanism. Warden is not a copy-protection mechanism.

Prior to considering Blizzard's copy-protection mechanisms, a brief discussion and example of copy-protection mechanisms might be useful. Blizzard's DMCA counterclaims relate to § 1201 ("Circumvention of copyright protection systems") of the DMCA. In general, I refer to "copyright protection" as copy protection throughout this statement. Based on my understanding, a copy-protection mechanism must protect against copyright infringement, and violation of the DMCA entails circumvention of such a mechanism. For example, a technology that circumvents technical measures to create unauthorized copies of copyrighted work clearly could be in violation of the law. More subtly, a technology that subverts technical measures to access copyrighted work could be in violation even if no infringing activity actually occurs but the technology makes infringing activity possible. Consider DVD copy protection. Manufacturers encrypt copyrighted video data on DVDs such that only authorized DVD players can decrypt the data. Authorized DVD players will only play the video and will not copy it. Therefore, users cannot directly access or copy decrypted video data. The specific DVD copy-protection methods presently in use have certain weaknesses, but their purpose is to control access to the decrypted video data to prevent unauthorized users from copying that data (*see* R. Anderson. Security Engineering: A Guide to Building Dependable Distributed Systems. John Wiley & Sons, Inc., pp. 430-432. 2001.). A user that subverts this copy protection could create infringing copies of the video data, placing the user in potential violation of the DMCA even if no infringing activity takes place. In the next several paragraphs, I explore measures that help protect Blizzard's copyrighted work. Following this, I discuss Blizzard's Warden program and explain that it is not a copy-protection mechanism.

Blizzard has a number of copy-protection mechanisms to help control access to its work, and I provide a potentially incomplete summary here. This summary is relatively inclusive when possible: I consider processes and mechanisms that arguably help protect against copyright infringement without considering the letter of the law. Blizzard distributes legitimate copies of its client software with unique authentication keys (*see Blizzard v. BNETD*) (users also may download the client software to establish a brief trial account, but to the best of my knowledge, they must obtain an authentication key to establish a full account). Because WoW is an online game, users must access Blizzard's servers to play it. To initially gain access to the servers and the WoW game environment with a full account, a user must supply a new unique authentication key and create an account, including a user name and password. Blizzard also asks for certain personal information, such as name, address, phone number, and, depending on the monthly payment method to be used, credit card or other payment information. When accessing the servers to play the game in the future, users must supply their user name and password for Blizzard's servers to permit them access to the in-game environment.

This scheme allows Blizzard to ensure, among other things, that a user able to copy the client software gains little value as only users with valid user identifiers and passwords tied to

legitimate authentication keys can access the online game environment. No more than one user per authentication key can access the game simultaneously, and users that have not paid their monthly fees have no access to the game. The WoW client software is easy to copy, so these are important achievements. In *Blizzard v. BNETD*, BNETD created software that emulated Blizzard's servers. Part of the justification for Blizzard's victory in that case is that only Blizzard's servers are able to verify that users have active accounts tied to legitimate authentication keys. Without this verification, a user with an illegitimate copy of the client software could access the in-game environment without, for example, having demonstrated possession of a valid, unique authentication key (*see Blizzard v. BNETD*). I have observed no means by which the Glider software subverts these mechanisms or assists users in making unauthorized copies of Blizzard's copyrighted work.

Blizzard also has a tool called Warden, which they present as an additional copy-protection mechanism. Because the precise definition of Warden is unclear, I define it to be the components of the WoW client software that assist in detecting both cheating activity and the presence of cheating programs. Blizzard's characterization of Warden as copy protection is incorrect. Cheating and use of cheating programs are activities that Blizzard contractually defines to be unacceptable for its users. Presumably, Blizzard has or could develop in-game mechanisms for helping to detect and investigate certain activity that it considers unacceptable. For example, Blizzard may have or could develop tools to help detect obscene communication between users inside the game as well as similar mechanisms to help detect cheating. To the best of my knowledge, Blizzard can investigate user reports of any unacceptable behavior, and customer service representatives can approach users' characters in the game and observe or converse with those characters to ensure that they are human-controlled and behaving in an acceptable manner.

To assist in the detection of cheating and cheating programs, Warden performs a number of checks for evidence of programs that it associates with cheating. Because Blizzard chooses what Warden will look for, Blizzard defines which programs are cheating programs. Presumably, Blizzard only designates a program as a cheating program if it would actually allow cheating while in the in-game environment. For users to cheat or use a cheating program while in the in-game environment, they must first gain access to the in-game environment. To gain access, users must prove themselves to be legitimate by demonstrating possession of valid accounts linked to valid authentication keys—I ignore the case in which a user somehow "breaks in" as Glider does not assist in such behavior. Warden is a tool that helps detect, in some cases proactively (it might find a cheating program even if the user has not yet used it to cheat), unauthorized use of Blizzard's work by a user that has legitimate access to that work. Warden neither prevents unauthorized copies from being made nor prevents unauthorized access to Blizzard's copyrighted work, as traditional copy-protection mechanisms seek to do. Warden is not like DVD copy protection but instead is like a mechanism to detect and report users that violate a contractual obligation not to smoke (for example) while watching a certain DVD. I have observed no evidence that would lead me to classify Warden as a copy-protection mechanism. Warden's presence or absence does not affect whether a user can copy any part of WoW. Therefore, Glider's subversion of Warden does not place MDY in violation of the DMCA.

Paragraph 56 of Blizzard's counterclaims states "But for the code in WoWGlider designed to avoid and bypass Warden, Warden would prevent users from accessing and making copies of WoW in random access memory." Because Warden is a component of the WoW client software that must load to random access memory to operate, this statement is incorrect or misleading regardless of whether loading a program to RAM is considered to produce a copy. Also note that, because WoW is an online game, authorized users see the output of the server software but cannot download that software regardless of whether Warden is circumvented or Glider is running.

I present two brief examples of why designation of Warden as a copy-protection mechanism is problematic. First, suppose that Blizzard's agreements arbitrarily stipulate that users not run a certain popular program while in WoW's in-game environment, but this program does not interact at all with WoW. If Blizzard updates Warden to detect this program and developers update the program to avoid Warden's detection, the hypothetical program's developers could be held liable for a DMCA violation (and, under Blizzard's interpretation of its user agreements and copyright law, a copyright violation). This seems surprising if absolutely no interaction between the WoW software and this hypothetical program even occurs. Second, Blizzard understandably prohibits obscene in-game communication between users. Assume that a user creates a program that can subvert Warden in a manner similar to Glider and that makes obscenity harder to detect with automated tools—for example, by replacing S's with $'s and a's with @'s in certain words. While such a program would allow inappropriate activity by legitimate users (and Blizzard has reasonable justification to prevent the use of obscenity in an environment where children may be present), it does not create copies, assist in creating copies, or subvert copy-protection mechanisms.

Conclusion

Based on my technical understanding, MDY's activities violate neither relevant copyright laws nor the DMCA. Glider automates in-game tasks for authorized WoW users, and the Glider software can be adapted to utilize its primary functionality with many games other than WoW. Blizzard's claims relating to copyright infringement rest on the fact that Glider launches its WoW client program, which results in the loading of the WoW client to a computer's random access memory. Glider, however, never copies the WoW client program outside of the single computer's memory hierarchy to which the program was legitimately installed. Further, the presence of a multi-level memory hierarchy is a performance measure, and in my opinion, the movement of data between these levels does not result in copies in a copyright sense. Blizzard uses a number of copy-protection measures to prevent unauthorized access to its copyrighted work, and Glider does not subvert these measures. While Glider does avoid detection by Blizzard's Warden, Blizzard's characterization of Warden as a copy-protection measure is incorrect. Warden is a measure for detecting potentially unauthorized activity—cheating and the use of cheating programs—by users that have obtained legitimate access to Blizzard's work. Blizzard may desire to obtain a greater level of control over the use of its work, but copyright law and the DMCA do not appear to support its desire in this case.

Qualifications and Publications:

Mr. Calandrino's qualifications are summarized in the attached curriculum vitae.

Compensation:

Mr. Calandrino is receiving compensation for this assignment from MDY Industries, LLC. at a rate of $275/hour.

Other Cases:

Mr. Calandrino has not given sworn testimony as an expert witness prior to this case.

Joseph A. Calandrino

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