IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

MZ AUDIO SCIENCES, LLC, Plaintiff, v. SONY GROUP CORPORATION (JAPAN), SONY CORPORATION OF AMERICA, SONY INTERACTIVE ENTERTAINMENT LLC, SONY PICTURES ENTERTAINMENT INC., SONY ELECTRONICS INC., SONY DADC US INC., Defendants.	C.A. No. **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff MZ Audio Sciences, LLC ("MZ Audio") as and for its complaint for patent infringement against Defendants Sony Group Corporation (Japan) ("SGCJ"), Sony Corporation of America ("SCA"), Sony Interactive Entertainment LLC ("SIEL"), Sony Pictures Entertainment Inc. ("SPE"), Sony Electronics Inc. ("SEI"), and Sony DADC US Inc. ("SDADC") (collectively, "Sony" or "Defendants") alleges as follows:

PARTIES

1. MZ Audio Sciences, LLC is a Delaware corporation with a principal place of business at of 3045 Idas Lane, Caledonia, New York 14423.

2. Defendant Sony Group Corporation (Japan) (formerly known as Sony Corporation) is a corporation organized under the laws of Japan, with a principal place of business at 7-1 Konan 1-Chome, Minato-Ku, Tokyo 108-0075 Japan. On information and belief, SGCJ or its agents perform infringing methods in the United States, and/or makes, sells, offers to sell, and/or imports products in the United States, including in this Judicial District, and

introduces infringing products into the stream of commerce knowing that they would be sold and/or used in this Judicial District and elsewhere in the United States.

3. Defendant Sony Corporation of America is a Delaware corporation with a principal place of business at 25 Madison Avenue, 26th Floor, New York, New York 10010. On information and belief, SCA or its agents perform infringing methods in the United States, and/or makes, sells, offers to sell, and/or imports infringing products in the United States, including in this Judicial District, and introduces infringing products into the stream of commerce knowing that they would be sold and/or used in this Judicial District and elsewhere in the United States. SCA may be served with process through its registered agent, The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, DE 19801.

4. Defendant Sony Interactive Entertainment LLC is a California limited liability company with a principal place of business at 2207 Bridgepointe Parkway, San Mateo, CA 94404. On information and belief, SIEL or its agents makes, sells, or offers to sell products or practices claimed methods throughout the United States, including in this Judicial District, and introduces infringing products into the stream of commerce knowing that they would be sold and/or used in this Judicial District and elsewhere in the United States. SIEL may be served with process through its registered agent, Corporation Service Company Which Will Do Business in California as CSC – Lawyers Incorporating Service, 2710 Gateway Oaks Drive, Suite 150N, Sacramento, CA, 95833.

5. Defendant Sony Pictures Entertainment Inc. is a Delaware corporation with a principal place of business at 10202 West Washington Boulevard, Culver City, CA 90232. On information and belief, SPE or its agents perform infringing methods in the United States, and/or makes, sells, offers to sell, and/or imports infringing products in the United States, including in

this Judicial District, and introduces infringing products into the stream of commerce knowing that they would be sold and/or used in this Judicial District and elsewhere in the United States. SPE may be served with process through its registered agent, Corporation Service Company, 251 Little Falls Drive, Wilmington, DE 19801.

6. Defendant Sony Electronics Inc. is a Delaware corporation with a principal place of business at 16535 Via Esprillo 1, San Diego, CA, 92127. On information and belief, SEI or its agents perform infringing methods in the United States, and/or makes, sells, offers to sell, and/or imports infringing products in the United States, including in this Judicial District, and introduces infringing products into the stream of commerce knowing that they would be sold and/or used in this Judicial District and elsewhere in the United States. SEI may be served with process through its registered agent, Corporation Service Company, 251 Little Falls Drive, Wilmington, DE 19801.

7. Defendant Sony DADC US Inc. ("SDADC") is a corporation organized and existing under the laws of Delaware, with its principal place of business located at 1800 North Fruitridge Avenue, Terre Haute, Indiana 47804. On information and belief, SDADC is a wholly-owned subsidiary of SCA. On information and belief, SDADC (or its agents) perform infringing methods in the United States, and/or makes, sells, offers to sell, and/or imports infringing products in the United States, including in this Judicial District, and introduces infringing products into the stream of commerce knowing that they would be sold and/or used in this Judicial District and elsewhere in the United States. SDADC may be served with process through its registered agent, Corporation Service Company, 251 Little Falls Drive, Wilmington, DE 19801.

JURISDICTION AND VENUE

8. This action arises under the patent laws of the United States, Title 35 of the United States Code. Accordingly, this Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a).

9. This Court has specific and general personal jurisdiction over Defendants pursuant to due process and/or the Delaware Long Arm Statute, due to Defendants having availed themselves of the rights of benefits of Delaware by incorporating under Delaware law and due to their substantial business in this forum, including: (i) at least a portion of the infringement alleged herein; and (ii) regularly doing or soliciting business, engaging in other persistent courses of conduct, and/or deriving substantial revenue from goods and services provided to individuals in Delaware and in this Judicial District. Defendants have more than minimal contacts with this District, and maintenance of this action within this District would not offend traditional notions of fair play and substantial justice.

10. Venue is proper in this District under 28 U.S.C. §§ 1391 (b)-(c) and 1400(b) because Defendants are subject to personal jurisdiction in this District.

11. Joinder of the Defendants in this action is proper pursuant to 35 U.S.C. § 299. As alleged in more detail below, the allegations of infringement against Defendants arise out of the same series of occurrences relating to the making, using, importing into the United States, offering for sale, or selling of the same accused products and/or practice of the same methods, and questions of fact common to each Defendant will arise in this action.

THE INVENTORS AND THEIR PATENTED INVENTIONS

12. Dr. Mark F. Bocko and Dr. Zeljko Ignjatovic are the inventors of U.S. Patent No. 7,289,961 (the "Asserted Patent").

13. Dr. Bocko is a professor of electrical and computer engineering and physics at the University of Rochester. He is currently the chair of the Audio and Music Engineering program at the University of Rochester.

14. Dr. Ignjatovic is an associate professor of electrical and computer engineering at the University of Rochester.

15. MZ Audio owns the Asserted Patent by assignment from Dr. Bocko and Dr. Ignjatovic. The Asserted Patent was filed as Application No. 10/870,685 on June 18, 2004, issued as a patent on October 30, 2007, and claims priority to provisional application No. 60/479,438 filed on June 19, 2003. A true and correct copy of the Asserted Patent is attached hereto as **Exhibit A**.

16. The Asserted Patent is entitled "Data Hiding Via Phase Manipulation Of Audio Signals" and relates generally to a method and system for changing the phase of an audio tone to embed data (watermark), and a method and system of extracting the embedded data (watermark) by identifying the phase change.

17. A watermark is data that is embedded in a media or document file that serves to identify the integrity, the origin or the intended recipient of the host data file. One attribute of watermarks is that they may be perceptible or imperceptible. A watermark also may be robust, fragile, or semi-fragile. The data capacity of a watermark is a further attribute. Trade-offs among these three properties are possible, and each type of watermark is tailored for specific use. For example, robust watermarks are useful for establishing ownership of data, whereas fragile watermarks are useful for verifying the authenticity of data.

18. Steganography literally means "covered writing" and is closely related to watermarking, sharing many of the attributes and techniques of watermarking. Steganography

works by embedding hidden messages within other, seemingly innocuous and overt messages, so that the visible innocuous messages will not arouse the suspicion of those wishing to intercept the embedded messages.

19. As a basic example, a message can be embedded in a digital bitmap image in the following manner. In each byte of the bitmap image, the least significant bit is discarded and replaced by a bit of the message to be hidden. While the colors of the bitmap image will be altered, the alteration of colors will typically be subtle enough that general observers will not notice. But the intended recipient can reconstruct the hidden message by extracting the least significant bit of each byte in the transmitted image. If the bitmap image has eight-bit color depth (256 colors), and the message to be hidden is a text message with eight-bit text encoding, then each letter of the text message can be encoded in, and extracted from, eight pixels of the bitmap image.

20. The field of steganography is receiving a good deal of attention due to interest in covert communication via the Internet, as well as other channels, and data hiding in information systems security applications. The single most important requirement of a steganographic method is that it be invisible to all but the intended recipient of the message.

21. Copy protection – also known as content protection, copy prevention and copy restriction – describes measures to enforce copyright by preventing the unauthorized reproduction of data in the form of software, films, music, and other media.

22. Steganography in digital audio signals is especially challenging due to the acuity and complexity of the human auditory system. Besides having a wide dynamic range and a fairly small differential range, the human auditory system is unable to perceive absolute monaural phase, except in certain contrived situations.

Failures of Prior Art Audio Watermarking Technology

23. Before MZ Audio's patented inventions, two companies, Verance and Digimarc, introduced prior art schemes for watermarking of audio signals. Ex. A, 2:34-36.

Verance Corporation's Prior Art Technology Failed

24. Verance provided software packages to companies interested in controlling the use of their copyrighted digital audio content, but the major application is in broadcast monitoring and verification. For that application, hidden tags are inserted into digital files for TV and radio commercials, programs and music, and a service is provided which monitors all airplay in all major US media markets so that reports can be provided to the advertisers and copyright owners. Ex. A, 2:39-47.

25. In 1999, Verance was selected to provide a worldwide industry standard for copy protected DVD audio and the Secure Digital Music Initiative ("SDMI"), and was adopted by the 4C Entity, a consortium of technology companies committed to "protecting entertainment content when recorded to physical media." Verance's audio watermarking technology was intended to embed inaudible yet identifiable digital codes into an audio waveform. The audio watermarks are expected to carry detailed information associated with the audio and audio-visual content for such purposes as monitoring and tracking its distribution and use, as well as controlling access to and usage of the content. Embedded watermarks travel with the audio and audiovisual content wherever it goes and are highly resistant to even the most sophisticated attempts to remove them. Ex. A, 2:48-62.

26. During the late 1990s and early 2000s, with the widespread success of the MP3 file format, the music and entertainment industries were rattled by sites like Napster, which permitted free, unfettered swapping of valuable copyrighted music files.

27. In response, the Recording Industry Association of America (RIAA)—an entertainment industry trade organization created to protect its members' interests, including their interests in preventing the unauthorized sharing of their media assets—formed the SDMI.

28. SDMI, a working group comprised of many businesses and organizations with significant interests in the future of digital music—including SPE and Sony Music Entertainment Inc.—set out to develop open technology specifications that protected the playing, storage, and distribution of digital music.

29. SDMI's strategy involved two stages. The first stage was to implement a secure digital watermarking scheme, which would allow music to be tagged with a secure watermark that was difficult to remove from the source audio without damaging it. The second was to ensure that SDMI compliant players would not play SDMI tagged music that was not authorized for that device.

30. The importance of SDMI's mission was not lost on Sony. Specifically, in August 2000, SPE's then Senior VP Steve Heckler gave a speech to attendees of the Americas Conference on Information Systems—where he all but declared that if the RIAA's SDMI did not stop unauthorized copying of digital content, Sony certainly would:

> The industry will take whatever steps it needs to protect itself and protect its revenue streams . . . It will not lose that revenue stream, no matter what . . .. Sony is going to take aggressive steps to stop this. We will develop technology that transcends the individual user. We will firewall Napster at source – we will block it at your cable company. We will block it at your phone company. We will block it at your ISP. We will firewall it at your PC... These strategies are being aggressively pursued because there is simply too much at stake.

See https://www.theregister.com/2000/08/23/we_will_block_napster/.

31. A key part of SDMI's strategy included demonstrating that the watermark could not be detected by third parties so they could not remove it from the audio content.

32. However, the problem with Verance's audio watermarking technology that SDMI selected for copyright protection was that it could be hacked. Ex. A, 2:63-64.

33. As part of the process of ratifying the technology, the SDMI announced a challenge with their "Open Letter to the Digital Community" on September 6, 2000. The letter invited hackers, cryptologists, and others to detect and remove the watermark from some sample pieces of music.

34. The 'hack SDMI' challenge resulted in the identification and removal of four of SDMI's watermarking technologies by a group of researchers from Princeton University, Rice University and the Xerox Palo Alto Research Centers.

35. The SDMI challenge "demonstrated that the watermark data can be detected and removed by hackers who were able to discover the key by applying general signal process analysis." Ex. A, 2:64-67. "The technology has not been accepted by the industry since its announcement in 1999." *Id*., 3:2-3.

Digimarc Corporation's Prior Art Technology Failed

36. Digimarc was founded in 1995 with a focus on deterring counterfeiting and piracy of media content through "digital watermarking," primarily for images and video. Digimarc did not have a significant business in audio watermarking at that time. However, in the late 1990s, Digimarc competed in an open, competitive bid process by the DVD Copy Control Association (DVD-CCA), to protect movies from piracy. "The DVD-CCA includes the leading companies from the motion picture, computer, and consumer electronics industries. The DVD-CCA decided on Aug. 1, 2002, that the offered technologies from Digimarc and its competitors were inadequate. An interim solution was announced by the DVD-CCA on Sep. 15, 2003." Ex. A, 3:4-24. The interim DVD-CCA solution is no longer in use.

Other Prior Art Copy Protection Technologies

37. An alternative data protection technique, as described in U.S. Pat. No. 6,539,475 (assigned to NEC Corp.), "has a trigger signal embedded in the data. If the embedded trigger mark is present, the data is considered to be a scrambled copy. The device then descrambles the input data if it detects a trigger signal. In the case of an unauthorized copy that contains a trigger signal with unscrambled data, the descrambler would render the data useless." Ex. A, 3:25-34.

38. "The principal weakness of this technology lies in the requirement to remove the protection before the data can be used. If an authorized person is able to insert the recording device after the descrambling, an unprotected and descrambled copy of the data can be made." Ex. A, 3:34-39.

39. In another copy protection scheme, U.S. Pat. No. 6,684,199 (assigned to the Recording Industry Association of America), discloses a system that authenticates data by introducing an authentication key in the form of a predetermined error. "The purpose is to prevent piracy through unauthorized access and unauthorized copying of the data stored on the media disc. While it is one of the few techniques in which the embedded watermark data survives when the media is converted between digital and analog forms, it remains vulnerable to signal processing analysis by hackers for watermark detection, removal, and/or alteration." Ex. A, 3:40-47.

MZ Audio's Patented Inventions Overcame Prior Art Technology Failures

40. Given their background, research interests in audio engineering and data protection, and academic environment at the University of Rochester, which houses the Eastman School of Music—one of the world's premiere music schools—Dr. Bocko and Dr. Ignjatovic were closely aware of the technological defects exposed by SDMI's hackers challenge and created novel inventions to overcome those defects.

41. In addition, to further develop the inventors' new technology, Dr. Bocko successfully applied for and received a research grant from the U.S. Air Force Research Laboratory ("AFRL"). Under the grant from AFRL and in connection with their research, Dr. Bocko and Dr. Ignjatovic continued to work closely together to further develop their inventions, including potential military applications.

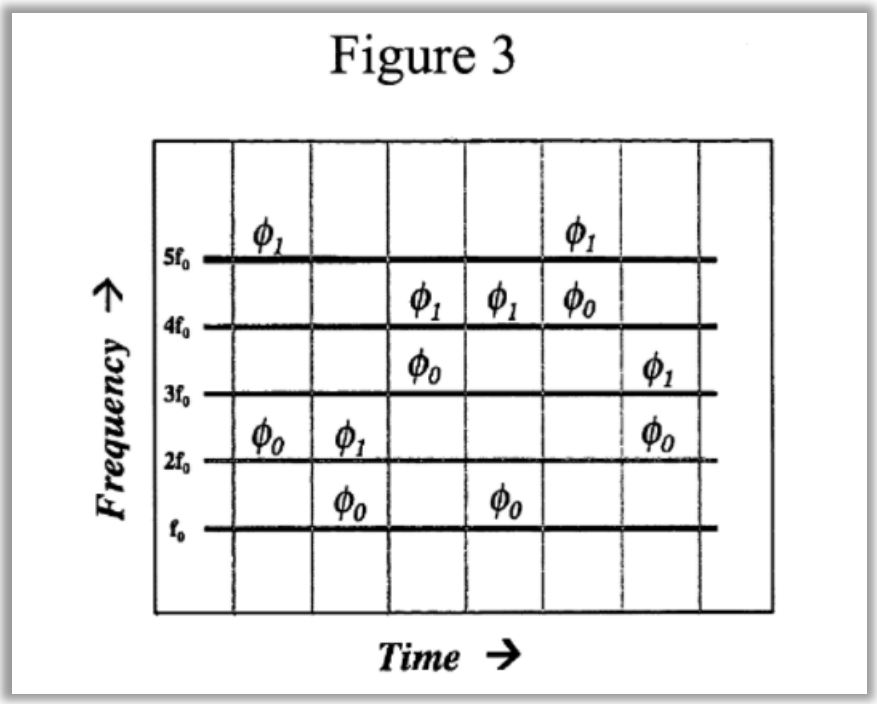
42. "Naturally occurring audio signals such as music or voice contain a fundamental frequency and a spectrum of overtones with well-defined relative phases. When the phases of the overtones are modulated to create a composite waveform different from the original, the difference will not be easily detected. Thus, the manipulation of the phases of the harmonics in an overtone spectrum of voice or music may be exploited as a channel for the transmission of hidden data." Ex. A, 4:14-21.

43. Overcoming the technical failures of the prior art, the inventions described and claimed in the Asserted Patent are directed to a technique in which the phase of certain chosen components of the host audio signal is manipulated.

44. Specifically, the inventors recognized the fact that these phases are apparently random presents an opportunity to replace the phase in the original sound file with any pseudo-random sequence in which one may embed hidden data.

45. According to the Asserted Patent, data is embedded in an audio signal for watermarking, steganography, or other purposes. The audio signal is divided into time frames. In each time frame, the relative phases of one or more frequency components are shifted to represent the data to be embedded. In one embodiment, two frequency components are selected according to a pseudo-random sequence, and their relative phase is shifted. In another embodiment, the phases of one or more overtones relative to the fundamental tone are quantized.

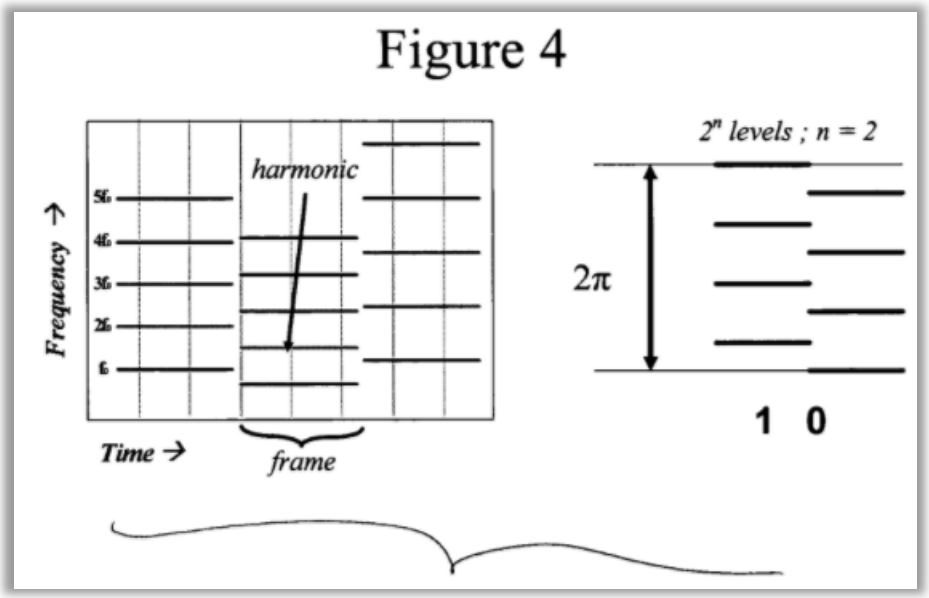
46. In one embodiment of the invention in the Asserted Patent, illustrated below, during each time frame one selects a pair (or more) of frequency components of the spectrum and re-assigns their relative phases. The choice of spectral components and the selected phase shift can be chosen according to a pseudo-random sequence known only to the sender and receiver. To decode, one must compute the phase of the spectrum and correlate it with the known pseudo-random carrier sequence.



See Ex. A, Fig 3.

47. More specifically, one embodiment of the inventions of the Asserted Patent relates to a phase encoding scheme in which information is inserted as the relative phase of a pair of partials ϕ_0, ϕ_1 in the sound spectrum. In each time frame a new pair of partials may be chosen according to a pseudo-random sequence known only to the sender and receiver. The relative phase between the two chosen spectral components is then modified according to a pseudo-random sequence onto which the hidden message is encoded.

48. Another embodiment of the inventions of the Asserted Patent, called the Relative Phase Quantization Encoding Scheme or the Quantization Index Modulation (QIM) scheme, is illustrated below.



See Ex. A, Fig 4.

49. In this embodiment, the following steps are employed. First, one computes the spectrum of a frame of audio data, then selects an apparent fundamental tone and its series of overtones as shown in the left plot of the figure above. Then, two of the overtones in the selected series are "relative phase quantized" according to one of two quantization scales, as shown on the right. The choice of quantization levels indicates a "1" or "0" datum. The relative phase-quantized spectrum is then inversely transformed to convert back to the time domain. This embodiment uses a variable set of phase quantization steps.

50. The inventions of the Asserted Patent have the advantage over prior art of being undetectable and robust to blind signal processing attacks and of being uniquely robust to digital to analog conversion processing.

51. While the prior art technologies for audio watermarking were susceptible to hacking, the inventions of the Asserted Patent involve application of the watermark to the audio channel in a way that resists hacking. For example, because tampering with the audio watermarking technology of the Asserted Patent would require detection and further manipulation of every intentionally introduced phase shift against a complex backdrop of apparently random phase relationships among the partials—and doing so would be difficult—the technology of the Asserted Patent remains undetectable and resistant to hacking.

52. Unlike the prior art technology which remained vulnerable to signal processing analysis by hackers, the inventions of the Asserted Patent allow the phase manipulation, and thus the hidden data such as a watermark to be detected by a receiver with the proper "key." Without the key, the hidden data is undetectable, both aurally and via blind digital signal processing attacks.

53. While most of the prior art technologies did not survive conversion from digital to analog, the inventions of the Asserted Patent allow a robust data recovery after digital-to-analog and back to digital conversion, even if the audio quality has been significantly degraded in the process. As the inventors disclosed, their "invention has the advantage over [then-]existing Verance algorithms of being undetectable and robust to blind signal processing attacks and of being uniquely robust to digital to analog conversion processing. The present invention can be used to watermark movies by applying the watermark to the audio channel in such a way as to resist detection or tampering." Ex. A, 4:31-37.

OVERVIEW OF SONY'S INFRINGEMENT OF THE ASSERTED PATENT

54. Sony is a global technology company engaged in the coordinated development, design, production, manufacture, and sale of game and network services, music, motion pictures, electronics products and solutions, imaging and sensing solutions, financial services, and other products and services. Sony operates as the world's largest video game console company and the largest video game publisher and is also one of the world's largest film studios.

55. SCA is an indirect, wholly-owned subsidiary of SCGJ and serves as Sony's United States headquarters. SCA manages Sony's United States-based business and recorded consolidated annual sales of approximately $76.67 billion USD for the fiscal year ending March 31, 2020. SCA employs approximately 114,400 people.[1]

56. SPE is a subsidiary of SCA and is the television and film production/distribution unit of Sony. For example, SPE acquires, produces, and distributes motion pictures, television programs, and recorded video, including film franchises such as Spider-Man, The Karate Kid, Ghostbusters, Men in Black, and Bad Boys.

57. SIEL is a subsidiary of SCA and is Sony's video game and digital entertainment arm. SIEL oversees the research and development, production, and sales of the hardware and software for Sony's PlayStation video game systems. SIEL also develops and publishes video game titles.

58. SEI is a subsidiary of SCA and provides audio-visual products, such as televisions, Blu-ray and DVD players, projectors, home theater products, still and video cameras, portable audio, smartphones, and mobile entertainment devices.

[1] *See* https://www.sony.com/en_us/SCA/who-we-are/overview.html.

59. On information and belief, SDADC, a wholly-owned subsidiary of SCA, manufactures, markets, sells, offers for sale, and distributes Blu-ray Discs that utilize the content protection technology claimed in the Asserted Patent.

60. On information and belief, SPE, SIEL, SEI, SCA, and SDADC act as the agents of SGCJ with respect to Sony's infringement of MZ Audio's Asserted Patent.

61. On information and belief, SGCJ controls and receives financial benefits from SPE, SIEL, SEI, and SDADC resulting from Sony's infringement of the Asserted Patent. For example, SGCJ, SPE, SEI, SIEL, and SDADC file consolidated financial statements and consolidated balance sheets.[2]

62. SGCJ publicly represents that its "principal U.S. businesses include Sony Electronics Inc., Sony Interactive Entertainment LLC., Sony Pictures Entertainment Inc., Sony Music Entertainment and Sony Music Publishing."[3] SGCJ describes Pictures, Electronics Products and Solutions, and Game and Network Services as "segments" of SGCJ.[4] SGCJ has announced that its "U.S. subsidiaries are responsible for U.S. sales." *See Solas OLED Ltd. v. LG Display Co., LTD, et al.*, No. 6:19-cv-00236, Dkt. No. 107 at 4 (W.D. Tex. Sept. 10, 2020) (attached as **Exhibit B**).

63. On information and belief, SGCJ directed and controlled the actions of SPE, SIEL, SEI, and SDADC as relating to Sony's strategy for the manufacture and sales of the infringing products and performance of infringing methods, and SGCJ has participated in the management of SPE's, SIEL's, SEI's, and SDADC's manufacture and sales of the accused products and performance of the claimed methods.

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[2] *See* https://www.sony.com/en/SonyInfo/IR/library/FY2020_20F_PDF.pdf.
[3] *See* https://www.sony.com/en_us/SCA/who-we-are/overview.html.
[4] *See* https://www.sony.com/en/SonyInfo/IR/library/download/sony_group_summary_E.pdf.

64. For example, on information and belief, SGCJ directed and controlled a Sony-wide strategy for Sony to adopt, use and deploy devices and methods that infringe MZ Audio's Asserted Patent—including making decisions as to which Blu-ray content protection technology to use and how to use it within Sony—particularly where disagreements emerged between its wholly-owned subsidiaries like SPE (which creates content it wanted protected) and SEI/SIEL (which makes devices that play, and thus must protect, SPE's content). On information and belief, SGCJ chose to adopt the infringing technology and required its wholly-owned entities to coordinate and work together to implement the infringing technology.

65. A few years later, around 2013 when SGCJ sponsored the development of the infringing FMP-X devices—originally called F1 to reflect SGCJ's strategy of "Four K by **One Sony**"— it assembled and directed a global cross-company team (including SPE, SIEL, SEI, SDADC) to ensure company-wide alignment and common understanding of phase one service planning. On information and belief, members of the global 4K by One Sony team included personnel from SGCJ, SCA, SEI, SPE, and SDADC. Such planning included establishing and coordinating efforts and workflows amongst Sony entities for embedding and detecting the infringing watermark technology at issue here to block playback of illegally copied content.

66. On information and belief, SPE, SIEL, SEI, and SDADC make, offer to sell, sell, and distribute the infringing products and practice the claimed methods in the United States and in this District on behalf of SGCJ. On information and belief, SGCJ, SPE, SIEL, SEI, SCA, and SDADC derive substantial revenue from sales of the accused products and performance of the claimed methods in the United States by SPE, SIEL, SEI, and SDADC.

Sony's Leadership Role in Promoting and Adopting the Infringing Technology

67. Sony is one of the world's largest producers of copyrighted audio and visual content. When distribution and peer-to-peer sharing of unauthorized music by entities such as

Napster began, Sony became intimately aware of the potential losses to revenue streams resulting from unprotected music content.

68. Based on Sony's wide-ranging investments in production and distribution of copyrighted video and audio data, Sony has long been a proponent of technologies aimed at copy protection for such data.

69. For example, with respect to pirated audio content from Napster and similar entities, as early as August 2000, SPE's senior VP Steve Heckler stated:

> The industry will take whatever steps it needs to protect itself and protect its revenue streams . . . It will not lose that revenue stream, no matter what . . .. Sony is going to take aggressive steps to stop this. We will develop technology that transcends the individual user. We will firewall Napster at source – we will block it at your cable company. We will block it at your phone company. We will block it at your ISP. We will firewall it at your PC... These strategies are being aggressively pursued because there is simply too much at stake.

See https://www.theregister.com/2000/08/23/we_will_block_napster/.

70. Around the same time, Sony was separately developing Blu-ray Disc technology to replace the DVD format. The main application for which Sony was developing the Blu-ray Disc format was as a medium for high-definition video material like full-length movies and video games. Sony created the first Blu-ray Disc prototypes in October 2000.

71. Based on Sony's leadership role in developing Blu-ray technology, it formed a consortium of nine leading electronic companies, including Sony, called "Blue-ray Disc Founder Group" of the Blu-ray Disc Association ("BDA") in February 2002. BDA is the Sony-initiated industry consortium that developed and licenses Blu-ray Disc technology and is responsible for establishing format standards and promoting business opportunities for Blu-ray Disc. Sony released the first consumer Blu-ray Disc player in April 2003 in Japan only. No movies were released for this player because movies studios—like SPE—refused to make and release content

for such players unless and until Blu-ray Disc players had suitable digital rights management content protection.

72. Blu-ray Disc players appeared in the U.S. and globally in 2006. The first six Blu-ray Discs titles were released on June 20, 2006, and 5 of the 6 were released by Sony: *50 First Dates*, *The Fifth Element*, *Hitch*, *House of Flying Daggers*, *Underworld: Evolution*, *xXx* (all Sony), as well as MGM's *The Terminator*.

73. Sony's PlayStation 3 ("PS3") included a Blu-ray Disc player and was released in November 2006. It was the first dedicated game device with a Blu-ray Disc player.

74. Given Sony's first-hand experience with losses due to unauthorized use of its music content, Sony also had a substantial interest in minimizing such losses from pirated or bootlegged film content from the new Blu-ray Disc technology format.

75. To ensure interoperability of Blu-ray Discs and devices, various specifications and standards were developed and adopted. One of those specifications is the Advance Access Content System ("AACS")—a specification for managing content stored on the next generation of prerecorded and recorded optical media for consumer use. AACS's technology was intended to offer a technological protection mechanism for content made available on Blu-ray Discs.

76. The AACS Licensing Administrator ("AACS LA") is a cross-industry consortium that was formed to develop, promote, and license AACS technology to content providers, content aggregators, and device manufacturers. The AACS LA founders consist of a small number of leading technology companies, including Sony, IBM, Intel, Microsoft, Panasonic, Disney, Toshiba, and Warner Bros.

77. Sony actively participated in AACS legal and business working groups, which influenced and guided AACS policy and strategy. On information and belief, Sony's leadership in AACS included monthly meetings and multiple hours of phone calls per week.

78. In 2009, based at least in part on Sony's advocacy as a creator of the Blu-ray Disc format, and as the only founder of AACS LA that both owns film studios as content creator and also owns manufacturers of content-playing devices—and based in part on Sony's early adoption and use of the technology itself—AACS LA adopted copy protection technology called Cinavia, which was publicly released by Verance Corporation long after the date of the inventions claimed in MZ Audio's Asserted Patent and adopted by Sony, which became an evangelist and promoter of the technology.

Press Releases / Announcements

AACS Issues Final Agreements, Enabling Commercial Deployment of Cinavia in Blu-ray Disc Players

June 5, 2009 SAN DIEGO, CA – AACS LA, LLC today issued final technical specifications and license agreements for their content protection solution for the Blu-ray Disc format, enabling consumer electronics manufacturers and computer software vendors to immediately begin including Verance's Cinavia technology in Blu-ray Disc players. Cinavia employs Verance's audio watermark technology to extend the existing content security architecture for Blu-ray Disc to protect against the use of unauthorized copies of commercial movies, such as those which originated from in-theater camcording or "ripped" DVDs.

See Press Releases / Announcements (https://web.archive.org/web/20091009025320/http:/www.verance.com/AdminSavR/news/news_item.php?news_id=42).

79. Cinavia employs a digital watermark into the audio signal of audio recordings in audiovisual content, enabling copy protection solutions for content owners.

80. When media with the watermark is played back on a system with Cinavia detection, the system's firmware will detect the media's watermark and check that the media is authorized to play on the device. If the media is not authorized (such as in the case of a pirated or

bootlegged copy of the media), a message is displayed to the user stating that the media is not authorized for playback on the device.

81. Sony was not only an early first adopter and evangelist for widespread adoption and use of the Cinavia technology—Sony and Verance worked so closely together on the technology and its promotion that Cinavia created a revolving door between Sony and Verance for employees and senior executives whereby Sony has employed multiple former Verance executives, and Verance leadership has similarly included a number of former Sony executives. For example,

- **Mitch Singer** served as SPE's chief digital strategy officer from 1991-2014 and, for at least part of that time, as SPE's chief technology officer as well. From 2008, Mr. Singer also served as President of the Digital Entertainment Content Ecosystem ("DECE")—a consortium of companies involved in the digital distribution of digital content, where he advocated for the use of Cinavia technology for 4K digital content and devices. Mr. Singer has stated that he first became aware of Cinavia during its early development stage, when he was CTO of Sony Pictures. When Mr. Singer left Sony in 2014, he was named Special Advisory, Industry Affairs at Verance, where he has also served as a consultant because, he has stated, he so strongly believes in the technology. Singer, whose role at Sony included responsibility for anti-digital theft and digital rights management, has also stated publicly: "At Sony Pictures, I saw firsthand how the Cinavia content protection technology drives additional sales by changing consumer viewing habits from piracy to purchase."
- **Don Eklund**, former EVP of Sony Pictures Technology for SPE, left Sony after 24 years to become Verance's Vice President of Business Development for nearly 3 years (2012-2015),

before subsequently returning to Sony in 2015 to serve as SCA's Senior Vice President of New Formats and then as SPE's EVP Chief Technology Officer starting in 2017.

- **Richard Glosser**, former President of Columbia TriStar Interactive, and EVP, Sony Online Entertainment (both for SPE) for more than 11 years, became Head of Business Development at Verance in 2016 and continues in that role today.
- **Scott Levine**, Verance's former VP of Business Development for more than 2 years, later served as Sony Music Entertainment's SVP of Corporate Development.
- **Hiroshi Tobita**, former Assistant Manager (2002-2006), and Business Development Manager at SGCJ (then "Sony Corporation") for more than 6 years (2008-2015), and also serving as a Director of Sony Computer Entertainment Inc. (2009-2015), left Sony to serve as Verance's Country Manager in Japan.
- **Jeffrey Persek**, served on Verance's Product Team as Technical Services Analyst / Product Tracking Specialist (2012-2014), where he performed IP Protection by monitoring protected media across multiple networks for security threats and product issues, and escalated viable threats to management. Mr. Persek left Verance for SPE directly to serve on SPE's Product Team as a Technical Operations Specialist and Product Manager (2014-2017).

82. Sony has widely advocated for the use of Cinavia and has adopted Cinavia content protection across the spectrum of its content and devices, even before Cinavia was required for Blu-ray devices. Sony's current and/or former executives, including at least Mitch Singer, have stated publicly that before Sony adopted and promoted Cinavia technology, one of the obstacles to such content protection was that voluntary detection by players of content was resisted because device manufacturers did not care if their devices were used to play unauthorized content. In fact, many device makers believed it gave them a commercial

advantage with motion picture content because it was becoming easy to find on P2P sites, torrents, etc. Further, studios that create content did not have direct deals in place with device manufacturers necessary for such content protection. That changed when Sony showed the way with Sony producing both the content protected with Cinavia watermarks, as well as the players that could protect such content with detectors of those watermarks.

83. In particular, Cinavia was first introduced as an optional component in Blu-ray Disc players and recorders in July 2009, and Sony was the earliest first adopter.

84. In November 2009, Sony released PS3 firmware update v3.10, which included Cinavia content protection.

85. As another example, Cinavia was identified as a required component of next-generation video services in MovieLabs' guidelines for 4K Ultra-HD content protection and has been integrated into Sony's 4K Ultra-HD media players.

86. Sony's theatrical soundtracks, Blu-ray Discs, and related media ("Sony's Media Content") utilize Cinavia content protection to prevent playback of unauthorized Sony content. For example, there are almost 2,000 Sony-produced Blu-ray titles currently available.

87. In 2010, the public began to become aware of the content protection provided by Cinavia when the movie *The Wolfman* was released on February 12. Unauthorized copies of the film—protected by Cinavia—would not play correctly, particularly on the PS3.

88. Cinavia has been mandatory for all new Blu-ray players to receive certification since 2012. It is likewise an industry requirement for UHD/4K players. The Cinavia technology has also been integrated into consumer electronics devices, software players, and components.

89. On information and belief, all Sony Blu-ray Disc players sold within the last six years, including Sony game and entertainment consoles, as well as standalone Blu-ray Disc players, utilize Cinavia content protection to prevent playback of unauthorized content.

Sony's Knowledge of the Asserted Patent

90. On information and belief, Sony has long been aware of MZ Audio's Asserted Patent and its infringement of that patent.

91. For example, at least since August 2010, MZ Audio's Asserted Patent has been discussed or referenced repeatedly and on many different sites and forums that Sony routinely monitors. For example, on or around August 2010, users of the internet forum RedFox disclosed the Asserted Patent as being related to the Cinavia technology.

92. Further, since January 2013 and continuing to this day, the Asserted Patent has been listed on Cinavia's Wikipedia page, and it is the only non-Verance patent identified.

93. Sony conducts routine monitoring of internet forums and sites for potential acts of piracy of Sony's Media Content. Sony, as an AACS founder, has also participated in and been informed of anti-piracy actions taken against certain sites or companies such as DVDFab, DVD Ranger, and SlySoft (a.k.a., RedFox) who have been attempting for years to hack Cinavia and disable its content protection ability. For example, SlySoft/RedFox was known to Sony as one of the most prominent and notorious hacker groups working to defeat the Cinavia technology. On information and belief, Sony routinely monitors forums like RedFox to not only identify and eliminate potential acts of piracy but to also gauge publicity regarding Sony's anti-piracy efforts related to Cinavia.

94. In addition, Verance monitors the same sites and forums, and would likewise have taken note of references to the Asserted Patent in such forums and other forums where the

Asserted Patent has been associated with Cinavia as described above. Based on the revolving door between Sony and Verance for senior executives as established, *supra*, on information and belief, Sony gained knowledge of the Asserted Patent at least from Verance, or while its executives were at Verance and then returned to Sony.

95. Because the Asserted Patent has been openly associated with Cinavia technology in several forums—including those Sony regularly monitors and is likely to monitor—Sony has had knowledge of the Asserted Patent and its infringement or has been willfully blind to the same prior to the filing of this Complaint.

COUNT I
(Direct Infringement of U.S. Patent No. 7,289,961)

96. Plaintiff re-alleges and incorporates by reference the allegations in the foregoing paragraphs as if fully set forth herein.

97. Plaintiff is informed and believes, and on that basis alleges, that Sony has directly infringed and is currently directly infringing one or more claims of the Asserted Patent, in violation of 35 U.S.C. § 271(a). Exemplary claims of the Asserted Patent are set forth below but Plaintiff's claims in this action, and Sony's infringement, are not limited to these exemplary claims.

A. Sony's Direct Infringement of Device Claim 9

98. Sony's Blu-ray players and PlayStations are devices that extract embedded data from an audio signal using the Cinavia Detector technology. Sony makes, uses, sells, offers to sell, and/or imports within this District and elsewhere in the United States, infringing Blu-ray media players and PlayStations (the "Infringing Players").

99. Sony's Infringing Players include, without limitation, all Sony devices capable of playing Blu-ray, including but not limited to the following exemplary Blu-ray media players and PlayStations, as well as comparable models that operate as described in the Infringement Count:

- UBP-X700/M - 4K Ultra HD Blu-ray™ Player with Dolby Atmos®, HDR, Wi-Fi for Streaming Video, and HDMI Cable;
- UBP-X700 - 4K Ultra HD Blu-ray™ Player with Dolby Atmos®, HDR, and Wi-Fi for Streaming Video;
- BDP-S3700 - Blu-ray™ Player with Built-in Wi-Fi;
- BDP-S1700 - Blu-ray™ Player with Wired Streaming;
- UBP-X800M2 - 4K Ultra HD Blu-ray™ Player with Dolby Atmos®, HDR, and Wi-Fi for Streaming Video;
- BDP-S6700 - Blu-ray™ Player with 4K Upscaling and Wi/Fi for Streaming Video;
- BDP-BX370 Blu-ray Disc Player with built-in Wi-Fi and HDMI cable;
- UBP-X1100ES 4K UHD Home Theater Streaming Blu-ray Player with HDR;
- FMP-X1 4K Ultra HD Media Player;
- FMP-X10 Ultra HD Media Player;
- All PlayStation 3 models, including CECHxxx;
- All PlayStation 3 Super Slim models, including CECH-40xxA, CECH-42xxA, CECH-43xxA, CECH-40xxB, CECH-42xxB, CECH-40xxC, CECH-42xxC, and CECH-43xxC;
- All PlayStation 4 models, including CUH-10xx, CUH-11xx and CUH-12xx;
- All PlayStation 4 Slim models, including CUH-20xx;
- All PlayStation 4 Pro models, including CUH-70xx;
- All PlayStation 5 models, including CFI-1xxxx, CFI-1015A, CFI-1015B, CFI-1018A, and CFI-11xxx.

100. Sony has infringed and is currently infringing literally and/or under the doctrine of equivalents, by, among other things, making, using, offering for sale, selling, and/or importing

in the United States, without license or authority, infringing products, including without limitation Sony's Infringing Players and related products and/or processes falling within the scope of one or more claims of the Asserted Patent, including Claim 9, reproduced below:

> 9. A device for extracting embedded data from an audio signal, the device comprising:
>
> an input for receiving the audio signal;
>
> a processor, in communication with the input, for:
>
> (a) dividing the audio signal into a plurality of time frames and, in each time frame, a plurality of frequency components;
>
> (b) in each of at least some of the plurality of time frames, selecting at least two of the plurality of frequency components;
>
> (c) determining a phase shift which has been applied to at least one of the plurality of frequency components in accordance with the embedded data; and
>
> (d) from the phase shift determined in step (c), extracting the embedded data; and
> an output for outputting the embedded data, wherein the processor preforms step (b) by selecting a fundamental tone and at least one overtone.

101. Sony's acts of making, using, offering for sale, selling, and/or importing infringing products, including but not limited to their Infringing Players and related products and/or processes satisfy, literally or under the doctrine of equivalents, each and every claim limitation of the Asserted Patent, including but not limited to limitations of claim 9.

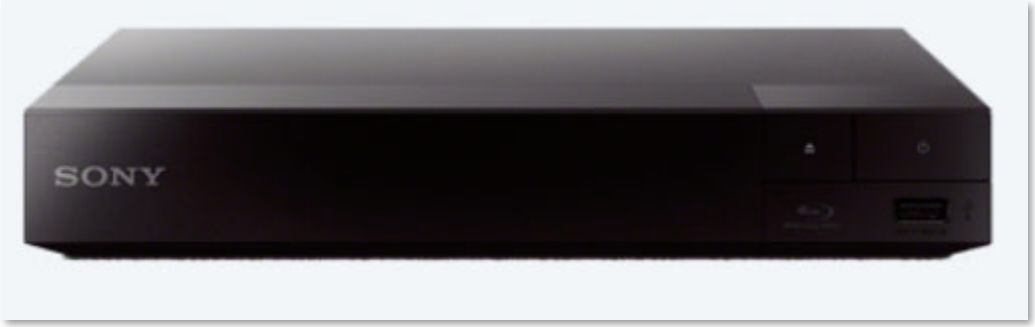
102. Specifically, Sony's Infringing Players (sold by at least SIEL and SEI) are Cinavia-enabled devices for extracting embedded data from an audio signal, comprising (1) an input for receiving the audio signal; (2) a processor, in communication with the input, for: (3) dividing the audio signal into a plurality of time frames and, in each time frame, a plurality of frequency components; (4) in each of at least some of the time frames, selecting at least two frequency components, including selecting a fundamental tone and at least one overtone; (5)

determining a phase shift of at least one of the frequency components; (6) extracting the embedded data determined from the phase shift; and (7) an output for outputting the embedded data.

103. Sony's Infringing Players meet each and every limitation of Claim 9. Sony's BDP-S6700 Blu-ray Player ("BDP-S6700") and PlayStation 4 ("PS4") are representative of Sony's Infringing Players.

104. In accordance with Cinavia specifications and BDA and AACS agreements, licenses, and rules, a watermark is embedded in the audio signal of media content. Sony's Infringing Players, as described below, detect, extract and decode the embedded watermark, enabling the Infringing Players to stop unauthorized use of media content.

105. Sony's Infringing Players are devices that extract embedded data from an audio signal. Screenshots of representative Sony Infringing Players are below, including Sony's BDP-S6700 and PS4, respectively.



See BDP-S6700 Blu-ray Player with 4K Upscaling and Wi/Fi for Streaming Video (https://electronics.sony.com/tv-video/Blu-ray-dvd-players/Blu-ray/p/bdps6700).

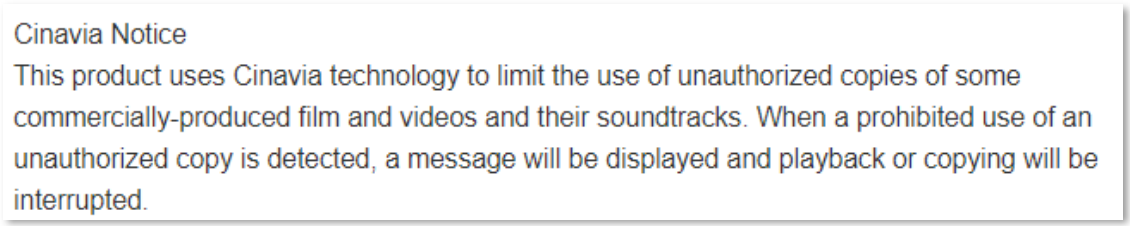
See Buy PlayStation®4 1TB Console (https://www.playstation.com/en-us/ps4/buy-ps4/).

106. Sony's Infringing Players utilize Cinavia technology to extract embedded data from an audio signal.

Cinavia Notice

This product uses Cinavia technology to limit the use of unauthorized copies of some commercially-produced film and videos and their soundtracks. When a prohibited use of an unauthorized copy is detected, a message will be displayed and playback or copying will be interrupted.

See SONY Blu-ray Disc™ / DVD Player Operating Instructions ("Operating Instructions") at 6 (https://www.sony.com/electronics/support/res/manuals/4579/42aa85036c579891f1d883848c9f88f1/45796691M.pdf).

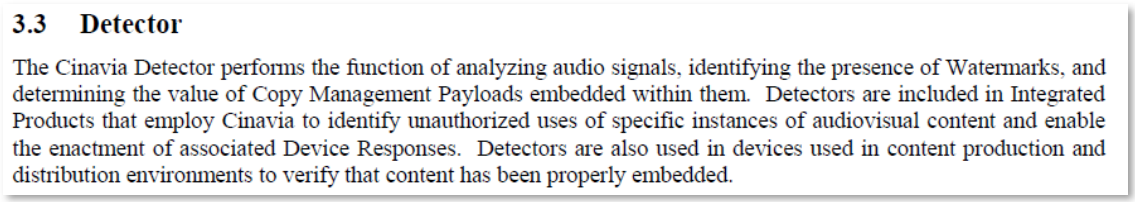


Cinavia Notice

This product uses Cinavia technology to limit the use of unauthorized copies of some commercially-produced film and videos and their soundtracks. When a prohibited use of an unauthorized copy is detected, a message will be displayed and playback or copying will be interrupted.

See PlayStation®4 User's Guide, Intellectual Property Notices (https://manuals.playstation.net/document/en/ps4/others/notices.html).

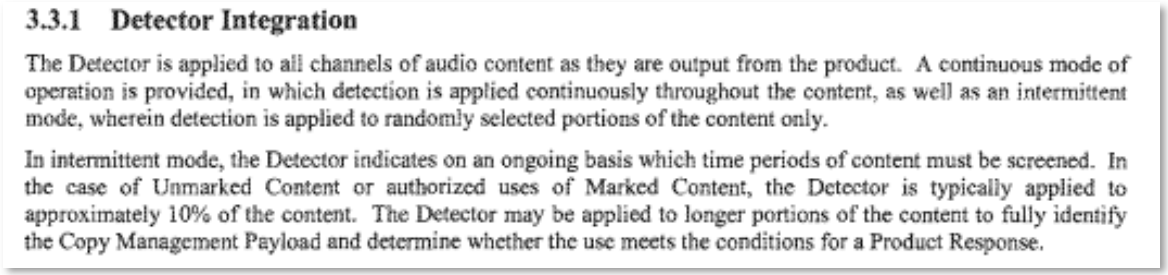
107. Sony's Infringing Players contain and use Cinavia Detectors to extract the watermark from the audio signal embedded in media content.



3.3 Detector

The Cinavia Detector performs the function of analyzing audio signals, identifying the presence of Watermarks, and determining the value of Copy Management Payloads embedded within them. Detectors are included in Integrated Products that employ Cinavia to identify unauthorized uses of specific instances of audiovisual content and enable the enactment of associated Device Responses. Detectors are also used in devices used in content production and distribution environments to verify that content has been properly embedded.

See **Exhibit D**, Cinavia System Specification, Ver. 1.3 (October 1, 2011) ("Cinavia System Specification) at Section 3.3; *see also*, **Exhibit C**, Cinavia System Specification, Ver. 1.2 (April 30, 2009) at Section 3.3.



3.3.1 Detector Integration

The Detector is applied to all channels of audio content as they are output from the product. A continuous mode of operation is provided, in which detection is applied continuously throughout the content, as well as an intermittent mode, wherein detection is applied to randomly selected portions of the content only.

In intermittent mode, the Detector indicates on an ongoing basis which time periods of content must be screened. In the case of Unmarked Content or authorized uses of Marked Content, the Detector is typically applied to approximately 10% of the content. The Detector may be applied to longer portions of the content to fully identify the Copy Management Payload and determine whether the use meets the conditions for a Product Response.

See Ex. D, Cinavia System Specification at Section 3.3.1.

108. Sony's Infringing Players include an input for receiving the audio signal. For example, Sony's Infringing Players support the Blu-ray Disc format:

Playable discs

Blu-ray Disc[*1]	BD-ROM BD-R[*2]/BD-RE[*2]
DVD[*3]	DVD-ROM DVD-R/DVD-RW DVD+R/DVD+RW
CD[*3]	CD-DA (Music CD) CD-ROM CD-R/CD-RW Super Audio CD

See Operating Instructions at 40.

Supported disc formats

Insert the disc, and then select the content from the content area. Your PS4™ system must enable the disc playback feature over the Internet, one time only, before you can play any BDs or DVDs. After this feature is enabled, your PS4™ system doesn't have to connect to the Internet to play BDs or DVDs.

- Blu-ray Disc
  - BD-ROM*1
  - BD-R/RE (BDAV, BDMV)
- DVD
  - DVD-ROM
  - DVD-R/RW*2 (video mode, VR mode*3)
  - DVD+R/RW*2

See PlayStation®4 User's Guide, Supported disc formats (https://manuals.playstation.net/document/en/ps4/videos/videodisc.html).

109. Further, Sony's Infringing Players support various file formats or codecs for reading audio and video data from the associated Blu-ray Discs or streaming media:

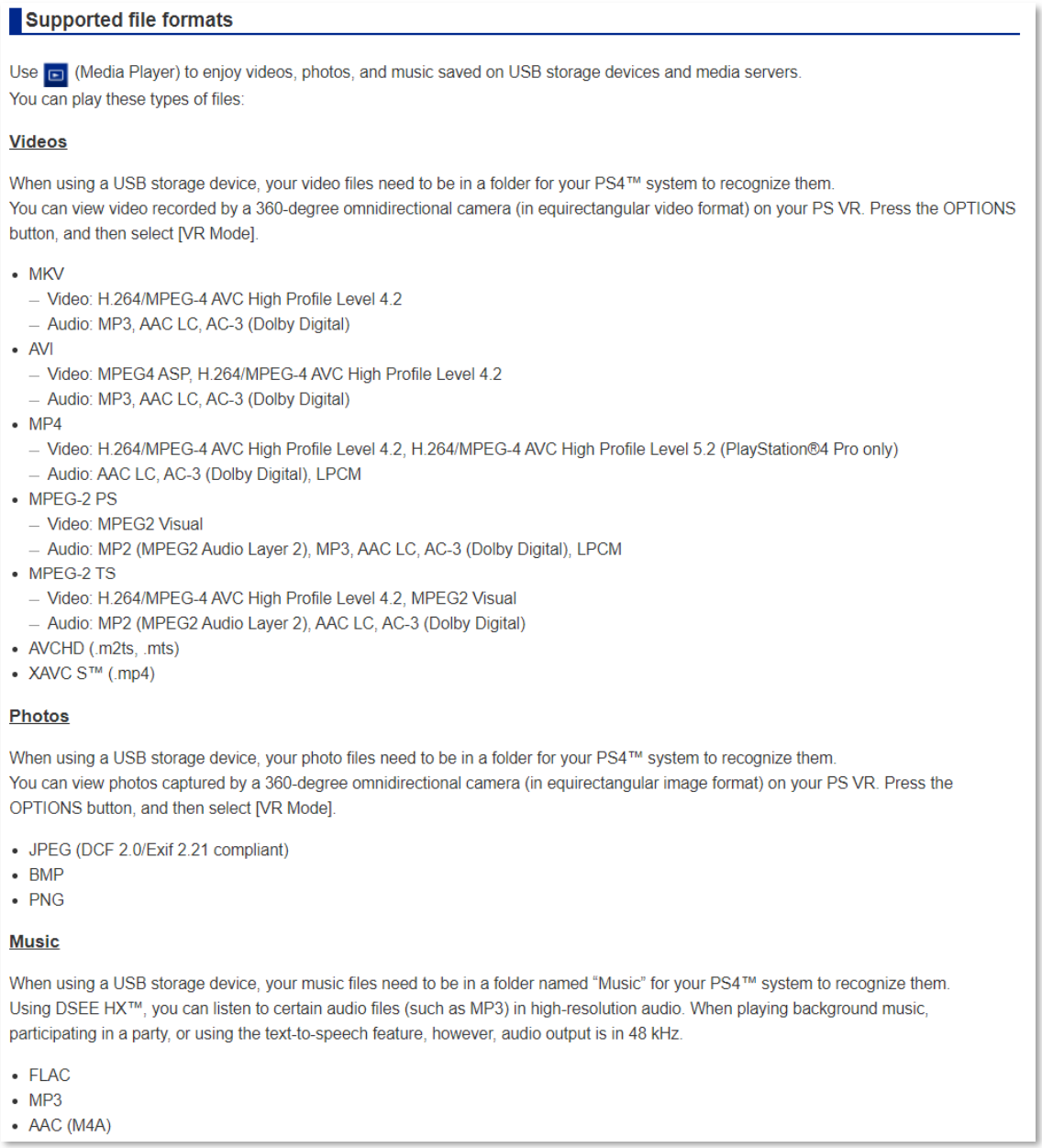
Playable types of files

Video

Codec	Container	Extension	With Audio
MPEG-1 Video*1	PS	.mpg, .mpeg	Dolby Digital, DTS, LPCM, MPEG
	MKV	.mkv	Dolby Digital, LPCM, AAC, MP3, Vorbis
MPEG-2 Video*2	PS*3	.mpg, .mpeg	Dolby Digital, DTS, LPCM, MPEG
	TS*4	.m2ts, .mts	Dolby Digital, DTS, LPCM, MPEG, AAC
	MKV*1	.mkv	Dolby Digital, LPCM, AAC, MP3, Vorbis
Xvid	AVI	.avi	Dolby Digital, LPCM, WMA9, MP3
	MKV	.mkv	Dolby Digital, LPCM, AAC, MP3, Vorbis
MPEG4/AVC*5	MKV*1	.mkv	Dolby Digital, LPCM, AAC, MP3, Vorbis
	MP4*1	.mp4, .m4v	AAC
	TS*1	.m2ts, .mts	Dolby Digital, DTS, LPCM, MPEG, AAC
	Quick Time*6	.mov	Dolby Digital, LPCM, AAC, MP3
	FLV*6	.flv, .f4v	LPCM, AAC, MP3
	3gpp/ 3gpp2*6	.3gp, .3g2, .3gpp, .3gp2	AAC
VC1*1	TS	.m2ts, .mts	Dolby Digital, DTS, LPCM, MPEG, AAC
	MKV	.mkv	Dolby Digital, LPCM, AAC, MP3, Vorbis
WMV9*1*7	ASF	.wmv, .asf	WMA9, WMA 10 Pro
	MKV	.mkv	Dolby Digital, LPCM, AAC, MP3, Vorbis
Motion JPEG*6	Quick Time	.mov	Dolby Digital, LPCM, AAC, MP3
	AVI	.avi	Dolby Digital, LPCM, AAC, MP3

Format
AVCHD (Ver.2.0)*1*8*9*10

See Operating Instructions at 41; *see also id.* at 42.



Supported file formats

Use (Media Player) to enjoy videos, photos, and music saved on USB storage devices and media servers.
You can play these types of files:

Videos

When using a USB storage device, your video files need to be in a folder for your PS4™ system to recognize them.
You can view video recorded by a 360-degree omnidirectional camera (in equirectangular video format) on your PS VR. Press the OPTIONS button, and then select [VR Mode].

- MKV
  - Video: H.264/MPEG-4 AVC High Profile Level 4.2
  - Audio: MP3, AAC LC, AC-3 (Dolby Digital)
- AVI
  - Video: MPEG4 ASP, H.264/MPEG-4 AVC High Profile Level 4.2
  - Audio: MP3, AAC LC, AC-3 (Dolby Digital)
- MP4
  - Video: H.264/MPEG-4 AVC High Profile Level 4.2, H.264/MPEG-4 AVC High Profile Level 5.2 (PlayStation®4 Pro only)
  - Audio: AAC LC, AC-3 (Dolby Digital), LPCM
- MPEG-2 PS
  - Video: MPEG2 Visual
  - Audio: MP2 (MPEG2 Audio Layer 2), MP3, AAC LC, AC-3 (Dolby Digital), LPCM
- MPEG-2 TS
  - Video: H.264/MPEG-4 AVC High Profile Level 4.2, MPEG2 Visual
  - Audio: MP2 (MPEG2 Audio Layer 2), AAC LC, AC-3 (Dolby Digital)
- AVCHD (.m2ts, .mts)
- XAVC S™ (.mp4)

Photos

When using a USB storage device, your photo files need to be in a folder for your PS4™ system to recognize them.
You can view photos captured by a 360-degree omnidirectional camera (in equirectangular image format) on your PS VR. Press the OPTIONS button, and then select [VR Mode].

- JPEG (DCF 2.0/Exif 2.21 compliant)
- BMP
- PNG

Music

When using a USB storage device, your music files need to be in a folder named "Music" for your PS4™ system to recognize them.
Using DSEE HX™, you can listen to certain audio files (such as MP3) in high-resolution audio. When playing background music, participating in a party, or using the text-to-speech feature, however, audio output is in 48 kHz.

- FLAC
- MP3
- AAC (M4A)

See PlayStation®4 User's Guide, Supported file formats (https://manuals.playstation.net/document/en/ps4/videos/mp_format_v.html).

110. Sony's Infringing Players include a processor, in communication with the input:

> This Sony Blu-ray player is one of the more feature-rich options available, and it's also relatively affordable. The BDP-S6700 has a dual-core processor, as well as dual-band Wi-Fi for a speedy wireless connection. Everything loads extremely quickly, with a Quick Start mode and Fast Loading to get Blu-ray discs playing almost instantly (in around 30 seconds from when you close the tray).

See The 8 Best Blu-ray and Ultra HD Blu-ray Players of 2021, Lifewire (https://www.lifewire.com/best-Blu-ray-players-1846400).

Product name	PlayStation®4
Product code	CUH-2000 series
Main processor	Single-chip custom processor CPU : x86-64 AMD "Jaguar", 8 cores GPU : 1.84 TFLOPS, AMD Radeon™ based graphics engine

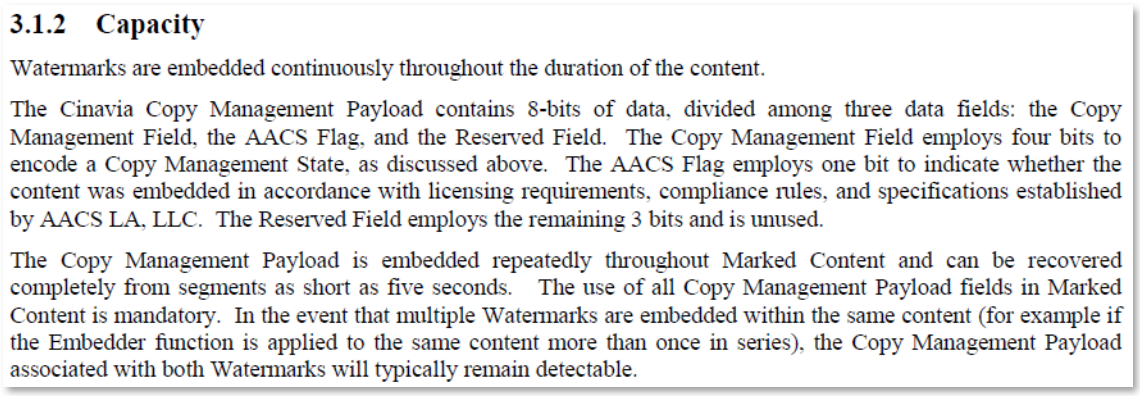
See Tech Specs, PS4 (https://www.playstation.com/en-us/ps4/tech-specs/).

111. Moreover, the processors of Sony's Infringing Players utilize Cinavia technology to extract data from the audio signal received by the input:

> To facilitate Blu-ray component and player manufacturers with the successful and timely integration of Cinavia technology with their products, Verance is offering a line of ready-to-use object-code libraries ("Cinavia Finished Detectors") that implement the Cinavia Detector Specification. This enables Cinavia Finished Detector customers to reduce their engineering effort, product costs, and time-to-market.
>
> Cinavia Finished Detectors have been certified by Verance to comply with the requirements of the Cinavia Detector specifications. There is no need for additional detector compliance validation or optimization, no source code to maintain and protect, and no requirement for specialized watermark technology or digital signal processing (DSP) expertise. Software robustness (i.e., tamper resistance) technology is not included, and must be applied to products including Finished Detectors prior to sale.
>
> For information on obtaining a Finished Detector customized to your SoC or DSP, including custom platforms and projects, contact Verance.

See Cinavia Finished Detectors for Embedded Platforms (https://web.archive.org/web/20100614004112/http:/www.verance.com/products/av_fd_program.php).

112. The processors of Sony's Infringing Players divide the audio signal into a plurality of time frames. The Cinavia watermark payload is repeated throughout the audio, so that processors of Infringing Players can detect it in a short time from among the plurality of time frames.



3.1.2 Capacity

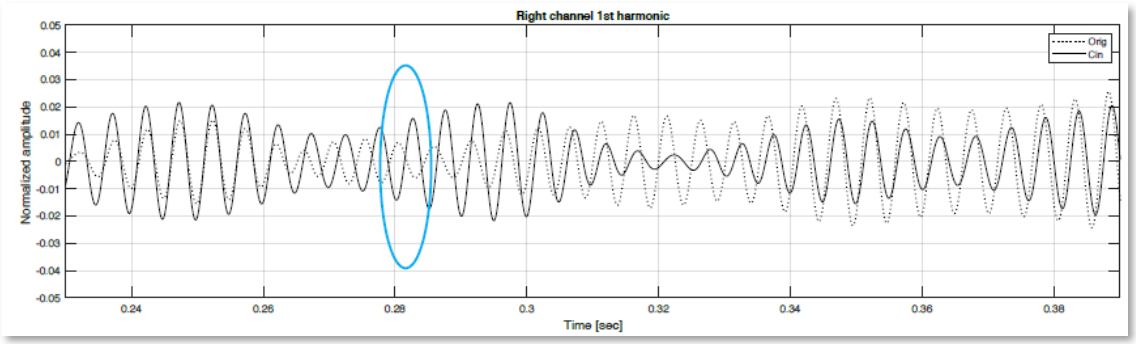
Watermarks are embedded continuously throughout the duration of the content.

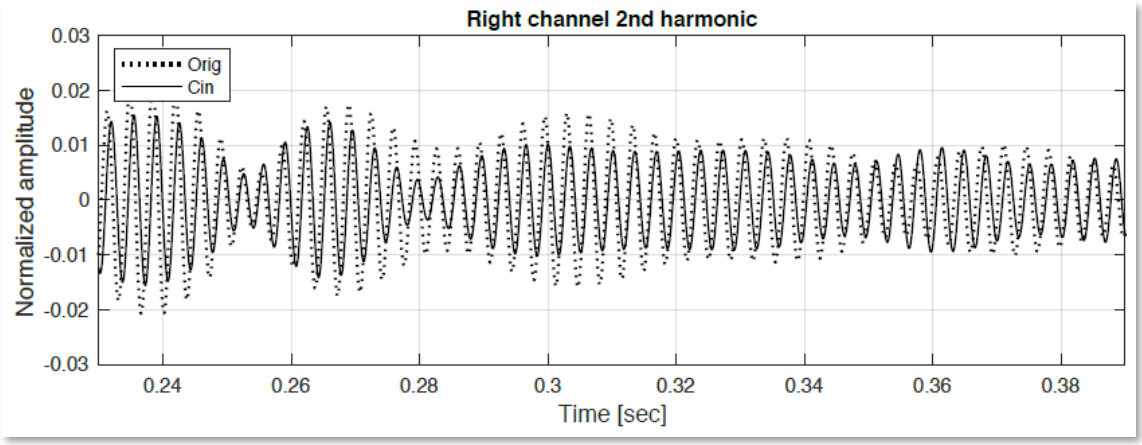
The Cinavia Copy Management Payload contains 8-bits of data, divided among three data fields: the Copy Management Field, the AACS Flag, and the Reserved Field. The Copy Management Field employs four bits to encode a Copy Management State, as discussed above. The AACS Flag employs one bit to indicate whether the content was embedded in accordance with licensing requirements, compliance rules, and specifications established by AACS LA, LLC. The Reserved Field employs the remaining 3 bits and is unused.

The Copy Management Payload is embedded repeatedly throughout Marked Content and can be recovered completely from segments as short as five seconds. The use of all Copy Management Payload fields in Marked Content is mandatory. In the event that multiple Watermarks are embedded within the same content (for example if the Embedder function is applied to the same content more than once in series), the Copy Management Payload associated with both Watermarks will typically remain detectable.

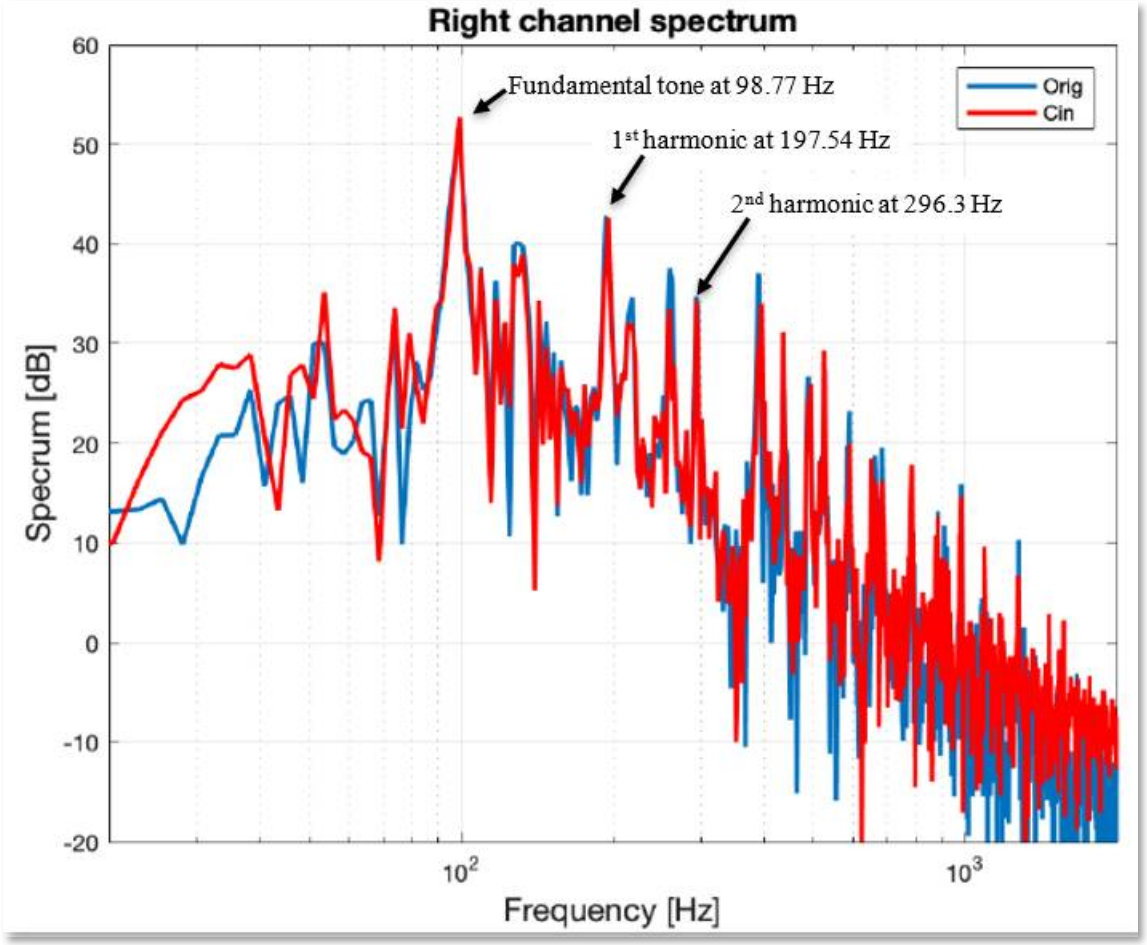
See Ex. D, Cinavia System Specification at Section 3.1.2.

113. Further, comparisons between audio tracks from a movie on a Sony-released Blu-ray Disc with Cinavia watermarking, and the same audio tracks without Cinavia watermarks, reveals that audio watermarked with Cinavia technology exhibits a conspicuous modification in a plurality of frequency components in a time frame, specifically a modification in the phase between a fundamental frequency and one or more harmonic frequencies. For example, in the comparative time waveform graph below, the harmonic at 197.54 Hz shows a phase change of approximately π radians at around 0.281 seconds between the harmonics in the watermark-free ("Orig") and watermarked ("Cin") versions. In contrast, the second harmonic at 296.3 Hz is held at a phase difference of approximately 0 radians. These conspicuous and selective phase shifts appear throughout audio watermarked with Cinavia technology.





114. In order to detect or decode such phase shifts, processors of Sony's Infringing Players divide a time frame into a plurality of frequency components, selecting a fundamental tone and at least one overtone as shown in the figure on the following page. That figure depicts the magnitude spectrum overlay of audio waveforms. The red line ("Cin") represents a waveform from a Sony Blu-ray Disc movie with a Cinavia watermark embedded in the audio signal. The blue line ("Orig") represents a waveform from the same movie without the watermark.



115. In order to detect such phase shifts between a fundamental and a harmonic frequency, processors of Sony's Infringing Players select at least two of the plurality of frequency components in each of at least some of the plurality of time frames, and determine a phase shift (e.g., a shift to π radians or to 0 radians) which has been applied to at least one of the plurality of frequency components in accordance with the embedded data, to retrieve the embedded data from the watermark to apply content use policies.

3 System Architecture

Cinavia employs an Embedder to insert a Watermark containing the Copy Management Payload into the audio portion of audiovisual content prior to its distribution to consumers. The Marked Content can be distributed through any means (although certain configurations of the Watermark can only be distributed in limited ways) and may ultimately be used on Integrated Products and Media Receivers that incorporate the Detector. The Detector enables those products to retrieve the information contained within the Watermark and apply content use policies in accordance with an applicable Supported Specification. The Cinavia system architecture is illustrated in Figure 2. In this example, Integrated Products incorporate Cinavia Detectors and content shown with a water droplet carry the Cinavia watermark.

To facilitate the harmonization of usage policies across multiple platforms, the Cinavia Copy Management Payload includes a common set of Copy Management States that describe the intended authorized uses or use limitations on the content and a common set of policies for their interpretation and response by Integrated Products and Media Receivers.

See Ex. D, Cinavia System Specification at Section 3.

116. The processors of Sony's Infringing Players extract the embedded data from the audio watermark. The conspicuous phase-shifting observed in the audio shows that Sony's Infringing Players determine the phase shift in the audio signal to retrieve or extract the embedded data (e.g., 0 = 0, 1 = π) in the watermark. *See id.*; *see also*:

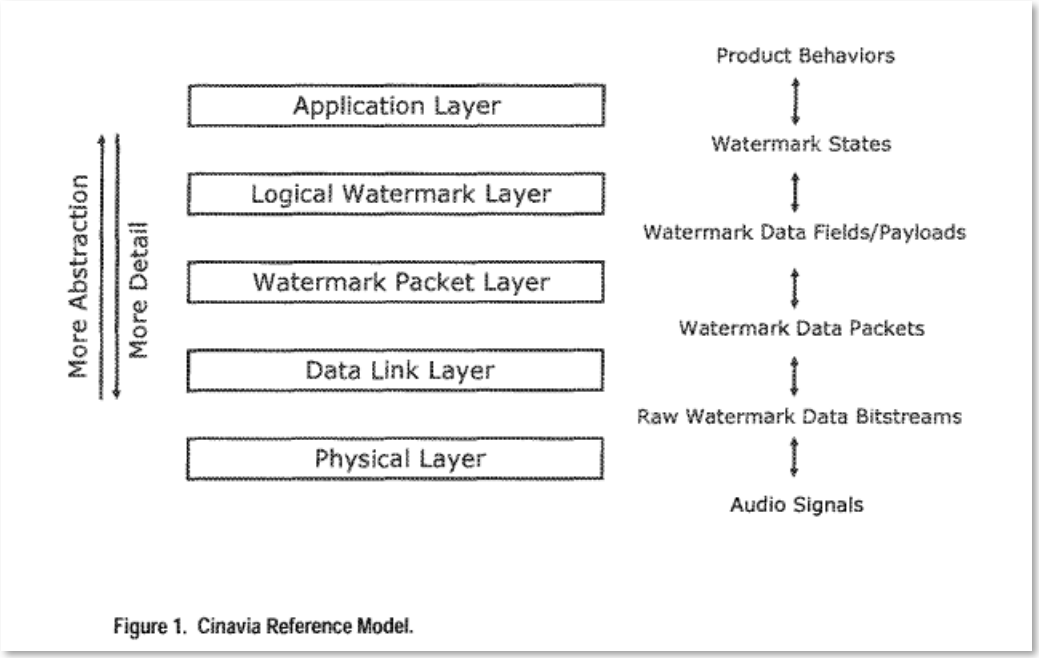


Figure 1. Cinavia Reference Model.

See Ex. D, Cinavia System Specification at Section 1 and Figure 1.

3.1.2 Capacity

Watermarks are embedded continuously throughout the duration of the content.

The Cinavia Copy Management Payload contains 8-bits of data, divided among three data fields: the Copy Management Field, the AACS Flag, and the Reserved Field. The Copy Management Field employs four bits to encode a Copy Management State, as discussed above. The AACS Flag employs one bit to indicate whether the content was embedded in accordance with licensing requirements, compliance rules, and specifications established by AACS LA, LLC. The Reserved Field employs the remaining 3 bits and is unused.

The Copy Management Payload is embedded repeatedly throughout Marked Content and can be recovered completely from segments as short as five seconds. The use of all Copy Management Payload fields in Marked Content is mandatory. In the event that multiple Watermarks are embedded within the same content (for example if the Embedder is applied to the same content more than once in series), the Copy Management Payload associated with both Watermarks will typically remain detectable.

See Ex. D, Cinavia System Specification at Section 3.1.2.

117. Sony's Infringing Players are integrated products and/or media receivers with Cinavia detectors for extracting embedded watermarks and an output for outputting the embedded data, which the Players then use to determine if they are authorized to play the watermarked content. In particular, the detectors of Sony's Infringing Players analyze audio signals, identify the presence of watermarks, determine the value of the Copy Management Payloads, and output the details of Copy Management Payloads found so the Players can apply playback content control policies based on the output.

3 System Architecture

Cinavia employs an Embedder to insert a Watermark containing the Copy Management Payload into the audio portion of audiovisual content prior to its distribution to consumers. The Marked Content can be distributed through any means (although certain configurations of the Watermark can only be distributed in limited ways) and may ultimately be used on Integrated Products and Media Receivers that incorporate the Detector. The Detector enables those products to retrieve the information contained within the Watermark and apply content use policies in accordance with an applicable Supported Specification. The Cinavia system architecture is illustrated in Figure 2. In this example, Integrated Products incorporate Cinavia Detectors and content shown with a water droplet carry the Cinavia watermark.

To facilitate the harmonization of usage policies across multiple platforms, the Cinavia Copy Management Payload includes a common set of Copy Management States that describe the intended authorized uses or use limitations on the content and a common set of policies for their interpretation and response by Integrated Products and Media Receivers.

See Ex. D, Cinavia System Specification at 2.

3.1.3.2 Certainty

When the Detector identifies and reports the value of the Copy Management Payload within Marked Content, it does so with a very high degree of certainty. The probability of the Detector reporting the presence of a Copy Management Payload value that was not actually embedded in the content ("false detection") is designed to be below 10^{-12} per 15 seconds of content, which is less than one occurrence per hour of operation of over 4 trillion independent Detectors.

See Ex. D, Cinavia System Specification at 6.

3.3 Detector

The Cinavia Detector performs the function of analyzing audio signals, identifying the presence of Watermarks, and determining the value of Copy Management Payloads embedded within them. Detectors are included in Integrated Products and Media Receivers that employ Cinavia to identify unauthorized uses of specific instances of audiovisual content and enable the enactment of associated Product Responses. Detectors are also used in products used in content production and distribution environments to verify that content has been properly embedded.

3.3.1 Detector Integration

The Detector is applied to all channels of audio content as they are output from the product. A continuous mode of operation is provided, in which detection is applied continuously throughout the content, as well as an intermittent mode, wherein detection is applied to randomly selected portions of the content only.

In intermittent mode, the Detector indicates on an ongoing basis which time periods of content must be screened. In the case of Unmarked Content or authorized uses of Marked Content, the Detector is typically applied to approximately 10% of the content. The Detector may be applied to longer portions of the content to fully identify the Copy Management Payload and determine whether the use meets the conditions for a Product Response.

Integrated Products and Media Receivers must configure the Detector with information including a list of Copy Management States that are subject to enforcement in the content given its Authorized Credentials. Audio must be provided to the Detector in unencrypted Linear PCM format. The Detector notifies the product when the response conditions associated with enforceable Copy Management Payload values present in content have been fulfilled.

3.3.2 Detector Products

The following Cinavia Detector Products are available for use in consumer products and professional applications:

- **Detector Reference SDK (DREF):** ANSI C Software Development Kit for Detector Development.
- **Finished Detector for Windows (FD-Win):** Finished detector for Intel-based computers running the Windows operating system.
- **Finished Detector for ARM (FD-ARM):** Finished detector for Arm A9-based systems-on-chip.

See Ex. D, Cinavia System Specification at 7.

4 Glossary

Copy Management Payload: The data area within the Cinavia Watermark that encodes the data related to copy management functions, including the Copy Management State and the AACS Flag.

Detector: The function of the same name combined with a System Integration Layer to facilitate the integration of the Detector function within an Integrated Product or Media Receiver, as designated in the Cinavia Detector Specification.

Product Response: The behavior an Integrated Product or Media Receiver is required to exhibit based on unauthorized uses of Marked Content.

Integrated Product: A consumer device or product that includes the Detector in accordance with the Cinavia Detector Specification, any applicable Cinavia Integrated Product Specifications, and the AACS Compliance Rules.

Marked Content: Content that includes audio containing Watermarks.

Media Receiver: A hardware product (or a combination of hardware products, or a combination of hardware and software products) that includes the Detector in accordance with the Cinavia Detector Specification, any applicable Cinavia Media Receiver Specifications, and the compliance rules defined by Supported Specifications.

PCM Audio: Digital audio waveform stored in PCM (Pulse Code Modulation) format.

Supported Specification: Specifications other than the Cinavia Specification that relate to how certain classes of Integrated Products and Media Receivers use the Cinavia technology, such as where and how they should incorporate a Detector, what uses of content are subject to Cinavia detection, and what the products should do when they encounter particular states of the Cinavia Copy Management Payload.

Unmarked Content: Content that does not include audio containing Watermarks.

VCMS/AV: The Verance Copy Management System for Audiovisual Content. An audio watermark-based technology for audiovisual content protection that is now named Cinavia.

Verify (or Verification or Verifying): The process of checking for the presence or absence of Watermarks and reporting the details of any Copy Management Payloads found in through the use of a Verifier Product.

Verifier Product: An end-user product that enables the process of Verification in commercial environments. Besides Verification, Verifier Products provide important features, such as audio interfacing, configuration, control, and activity logging.

Watermark: The embodiment of one or more data payloads within audio content.

See Ex. D, Cinavia System Specification at 7.

118. In addition to Sony's Infringing Players (sold by at least SIEL and SEI), SPE directly infringes claim 9. On information and belief, following embedding of data, SPE or its agents use a file-based or real-time Cinavia verifier on a host CPU platform to check for the presence of the Cinavia watermark.[5] Verification is used to ensure that embedding has been carried out successfully.

119. The verifier provides a number of configurable audible and visible alarms for various combinations of copy management states. For example, before mastering, the presence of Cinavia watermarks in the audio would be considered an alarm condition, whereas after an

[5] *See, e.g.*, Dean Angelico et al., *Workflows for Embedding Content Protection Watermarks in Theatrical Soundtracks* 4-6 (2010) (attached as **Exhibit F**); Ex. D, Cinavia System Specification at 2, 6-8.

embedding session, the absence of watermarks would be considered an error. The verifier provides a means to configure through its user interface alarms for such conditions.[6]

120. SPE's use of verification devices meets each and every limitation of Claim 9. SPE or its agents use Cinavia-enabled devices for extracting embedded data from an audio signal, comprising (1) an input for receiving the audio signal; (2) a processor, in communication with the input, for: (3) dividing the audio signal into a plurality of time frames and, in each time frame, a plurality of frequency components; (4) in each of at least some of the time frames, selecting at least two frequency components, including selecting a fundamental tone and at least one overtone; (5) determining a phase shift of at least one of the frequency components; (6) extracting the embedded data determined from the phase shift; and (7) an output for outputting the embedded data.

B. Sony's Direct Infringement of Method Claim 1

121. Sony has infringed and is currently infringing literally and/or under the doctrine of equivalents, by, among other things, itself practicing, or using agents at its direction and control to practice, without license or authority in the U.S., one or more method claims of the Asserted Patent, including at least Claim 1, reproduced below:

> 1. A method for embedding data in an audio signal, the method comprising:
>
> (a) dividing the audio signal into a plurality of time frames and, in each time frame, a plurality of frequency components;
>
> (b) in each of at least some of the plurality of time frames, selecting at least two of the plurality of frequency components; and
>
> (c) altering a phase of at least one of the plurality of frequency components in accordance with the data to be embedded, wherein:
>
> step (b) comprises selecting a fundamental tone and at least one overtone; and

[6] *See id*. at 5.

step (c) comprises quantizing a phase difference of the at least one overtone relative to the fundamental tone to embed at least one bit of the data to be embedded.

122. Sony directly infringes Claim 1 by performing each step of the method itself, or by third parties under its direction and control by conditioning a benefit upon performance of a step or steps of the claimed method such that the performance of such any such method steps is attributable to Sony, including without limitation based on Sony's instructions and requirements to embed data in audio signals as claimed in Claim 1 of the Asserted Patents and in conformance with the Cinavia specifications for embedding data in the audio signal of Sony's Media Content.

123. For example, SPE's production of Sony's Media Content includes embedding data in an audio signal, the method for embedding comprising: (1) dividing the audio signal into a plurality of time frames and, in each time frame, a plurality of frequency components; (2) in at least some of the time frames, selecting at least two frequency components, including selecting a fundamental tone and at least one overtone; and (3) altering the phase of at least one of the frequency components within a time frame by quantizing a phase difference of the overtone relative to the fundamental tone for embedding data.

124. For example, in accordance with Cinavia specifications and AACS agreements, licenses, and rules, SPE embeds the audio signal of Sony's Media Content with an audio watermark.

> 2.12 "Audio Watermark" means the audio watermark described in the Cinavia Specifications where such audio watermark contains the AACS Trusted Source State and/or the AACS No Home Use State.

See **Exhibit E**, AACS Adopter Agreement, Exhibit E – Compliance Rules ("Compliance Rules") (November 15, 2012) at E-3.

> 2.16 "Cinavia Specifications" means all documents necessary to implement the Cinavia™ audio watermark as provided by Verance Corporation. Such documents include, but are not limited to, the Cinavia™ Integrated Product Specification, the Cinavia™ System Specification, and the Cinavia™ Detector Specification.

See Ex. E, Compliance Rules at E-4.

125. SPE uses Cinavia Embedders and/or equivalent tools to insert the watermark into the audio signal of Sony's Media Content.

> **3.2 Embedder**
>
> Cinavia Embedders are used during content production and distribution to insert Watermarks in the audio portion of audiovisual content. Watermark Embedders are incorporated within Embedder Products, which provide additional functions, including embedder configuration, audio interfacing, and activity logging.

See Ex. D, Cinavia System Specification at Section 3.2.

> **3.2.2 Embedding and Verification Products**
>
> The following commercial Embedding and Verification Products are available for content production environments:
>
> - **Cinavia Embedder for Mac Desktop (DTE):** GUI desktop application for embedding and verifying Cinavia watermarks in files.
> - **Cinavia Embedder for PC/Mac Command Line (CLE):** Console command line application for embedding and verifying Cinavia watermarks in files.
> - **Cinavia Verifier for PC/Mac Desktop (DTV):** GUI desktop application for verifying Cinavia watermarks in audio files and streams.
> - **Cinavia Verifier Plug-in for EclipseSuite (CIV):** Plug-in resource invoked from the EclipseSuite application (http://www.eclipsedata.com) for verifying Cinavia watermarks within optical disc images.
> - **Cinavia Verifier for Pro Tools® (CV-PT):** Plug-in resource invoked from the Pro Tools application (http://www.avid.com/US/products/Pro-Tools-Software) for verifying Cinavia watermarks within streams.
>
> Additional information on these products is available from Verance Corporation.

See Ex. D, Cinavia System Specification at Section 3.2.2.

> **Tools for Embedding and Verifying**
>
> Cinavia employs an embedder to insert the watermark containing the Copy Management State into the audio portion of audiovisual content prior to its presentation or distribution to consumers. A verifier is used to check for the presence of the Cinavia watermark and provides a report if any Copy Management States are found. Both Cinavia embedders and verifiers are available for use in either filed-based or real-time post-production workflows and run on a variety of host CPU platforms.

See also Ex. F at 4.

126. To embed the watermark into the audio signal of Sony's Media Content, SPE uses embedders to divide the audio signal into a plurality of time frames. The Cinavia watermark payload is repeatedly embedded throughout the audio so that it can be detected in a short time from among the plurality of time frames.

3.1.2 Capacity

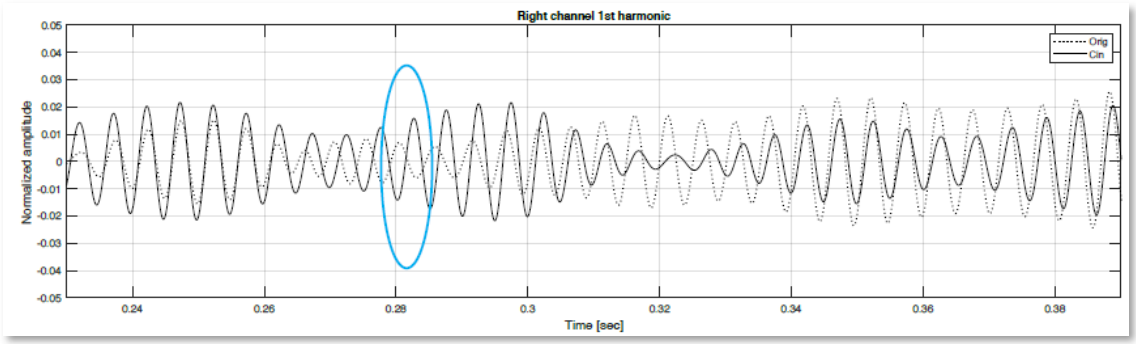
Watermarks are embedded continuously throughout the duration of the content.

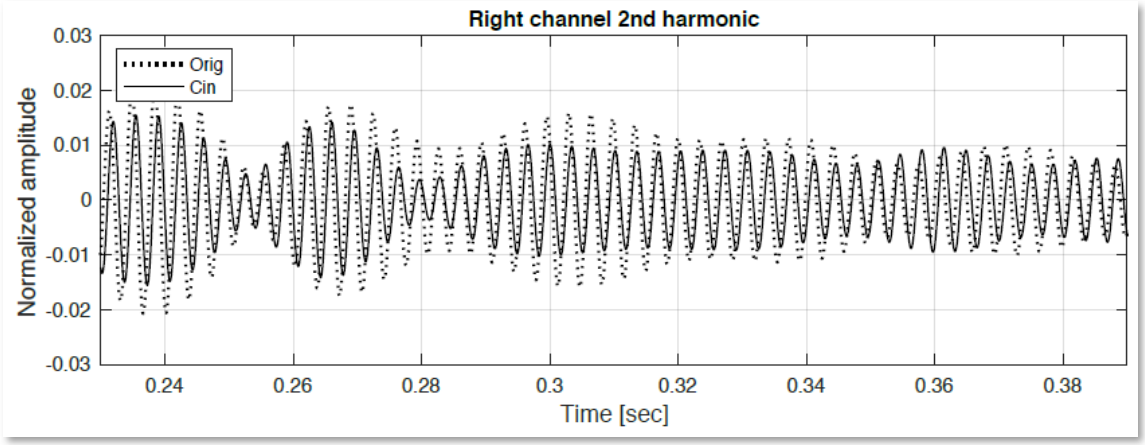
The Cinavia Copy Management Payload contains 8-bits of data, divided among three data fields: the Copy Management Field, the AACS Flag, and the Reserved Field. The Copy Management Field employs four bits to encode a Copy Management State, as discussed above. The AACS Flag employs one bit to indicate whether the content was embedded in accordance with licensing requirements, compliance rules, and specifications established by AACS LA, LLC. The Reserved Field employs the remaining 3 bits and is unused.

The Copy Management Payload is embedded repeatedly throughout Marked Content and can be recovered completely from segments as short as five seconds. The use of all Copy Management Payload fields in Marked Content is mandatory. In the event that multiple Watermarks are embedded within the same content (for example if the Embedder function is applied to the same content more than once in series), the Copy Management Payload associated with both Watermarks will typically remain detectable.

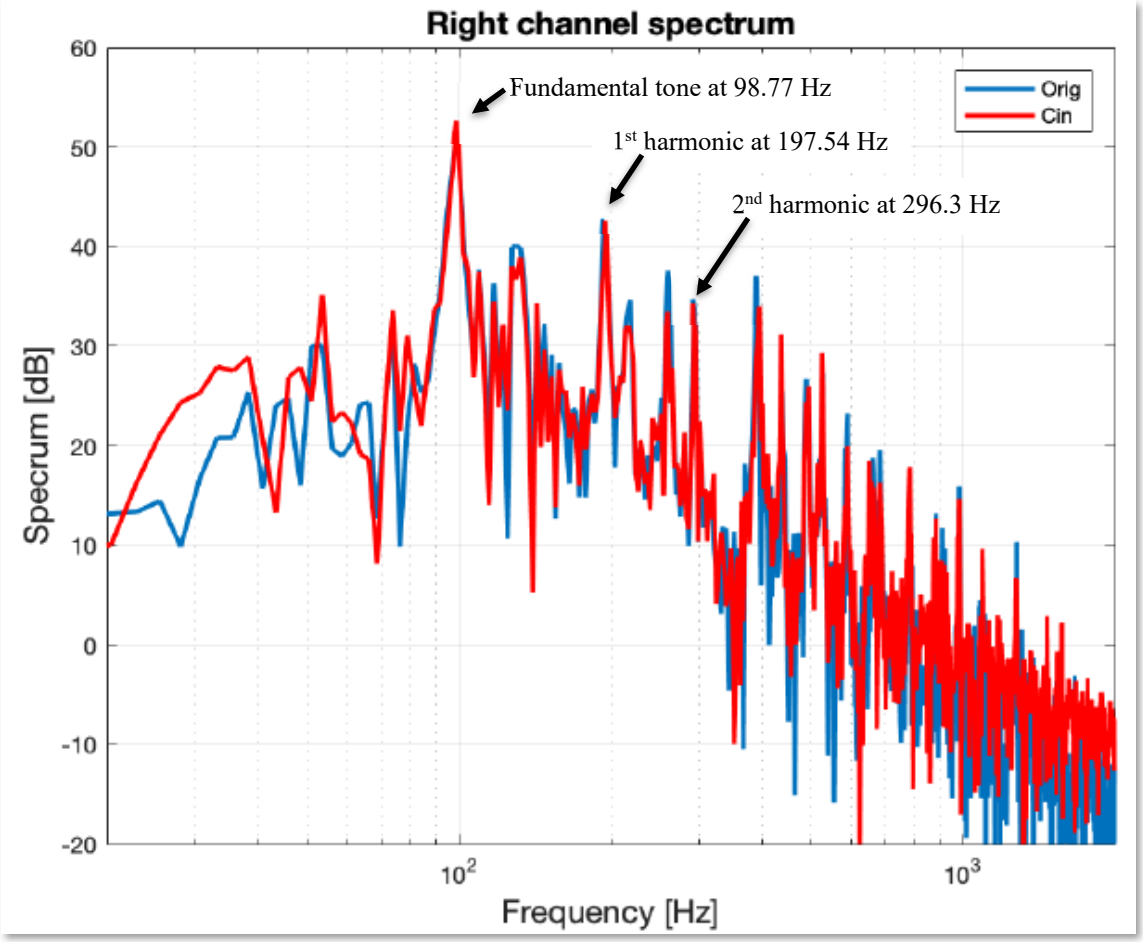
See Ex. D, Cinavia System Specification at Section 3.1.2.

127. Further, comparisons between audio tracks from a movie on a Sony-released Blu-ray Disc with Cinavia watermarking, and the same audio tracks without Cinavia watermarks, reveals that audio watermarked with Cinavia technology exhibits a conspicuous modification in a plurality of frequency components in a time frame, specifically a modification in the phase between a fundamental frequency and one or more harmonic frequencies. For example, in the comparative time waveform graph below, the harmonic at 197.54 Hz shows a phase change of approximately π radians at around 0.281 seconds between the harmonics in the watermark-free ("Orig") and watermarked ("Cin") versions. In contrast, the second harmonic at 296.3 Hz is held at a phase difference of approximately 0 radians. These conspicuous and selective phase shifts appear throughout audio watermarked with Cinavia technology.





128. To embed or encode such phase shifts, SPE's production of Sony's Media Content divides a time frame into a plurality of frequency components, selecting a fundamental tone and at least one overtone as shown in the figure on the following page. That figure depicts the magnitude spectrum overlay of audio waveforms. The red line ("Cin") represents a waveform from a Sony Blu-ray Disc movie with a Cinavia watermark embedded in the audio signal. The blue line ("Orig") represents a waveform from the same movie without the watermark.



129. In order to embed such phase shifts between a fundamental and a harmonic frequency, SPE's process selects at least two of the plurality of frequency components in each of at least some of the plurality of time frames, and alters a phase of at least one of the plurality of frequency components (e.g. an alteration to π radian or to 0 radians) in accordance with the data to be embedded.

3 System Architecture

Cinavia employs an Embedder to insert a Watermark containing the Copy Management Payload into the audio portion of audiovisual content prior to its distribution to consumers. The Marked Content can be distributed through any means (although certain configurations of the Watermark can only be distributed in limited ways) and may ultimately be used on Integrated Products and Media Receivers that incorporate the Detector. The Detector enables those products to retrieve the information contained within the Watermark and apply content use policies in accordance with an applicable Supported Specification. The Cinavia system architecture is illustrated in Figure 2. In this example, Integrated Products incorporate Cinavia Detectors and content shown with a water droplet carry the Cinavia watermark.

To facilitate the harmonization of usage policies across multiple platforms, the Cinavia Copy Management Payload includes a common set of Copy Management States that describe the intended authorized uses or use limitations on the content and a common set of policies for their interpretation and response by Integrated Products and Media Receivers.

See Ex. D, Cinavia System Specification at Section 3.

130. Further, SPE uses embedders to alter the audio signal of Sony's Media Content and embed such alterations into the audio watermark. The conspicuous phase-shifting observed in the audio shows that SPE's embedders alter the phase in the audio signal to embed data (e.g., 0 = 0, 1 = π) in the watermark. *See id.*; *see also*:

The scope of the Cinavia specification can be understood through the reference model illustrated in Figure 1. A hierarchy of five layers of abstraction are provided (Physical, Data Link, Watermark Packet, Logical Watermark, and Application), each encompassing a different aspect of Cinavia system behavior. Each layer in the hierarchy defines the functional relationship between two data elements of the system (Audio Signals, Raw Watermark Data Bitstreams, Watermark Data Packets, Watermark Data Fields/Payloads, Watermark States, and Product Behaviors).

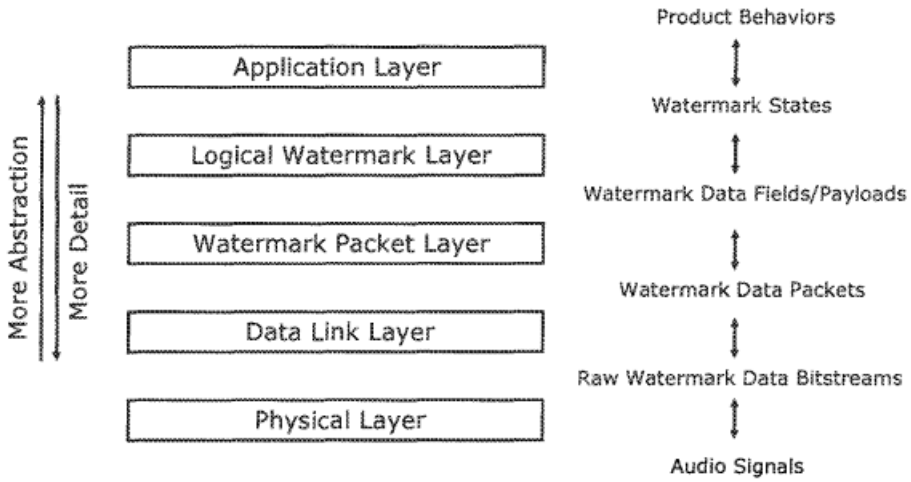
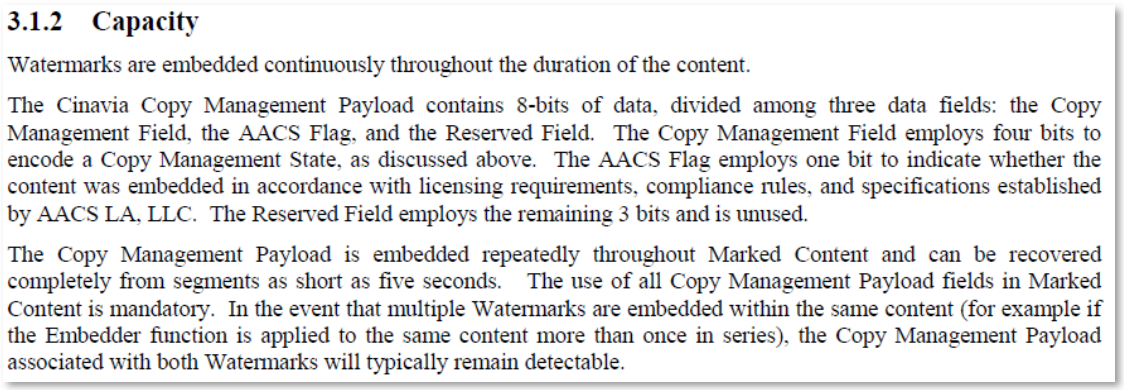


Figure 1. Cinavia Reference Model.

See Ex. D, Cinavia System Specification at Section 1 and Figure 1.

131. As a result of the phase shift of the harmonic or overtone, at least one bit of data is embedded as a watermark in the audio signal of Sony's Media Content. For example, the watermark is represented by the phase shift of the first harmonic, referred to as quantization (e.g., 0 = 0, 1 = π), which involves at least one bit of data.



3.1.2 Capacity

Watermarks are embedded continuously throughout the duration of the content.

The Cinavia Copy Management Payload contains 8-bits of data, divided among three data fields: the Copy Management Field, the AACS Flag, and the Reserved Field. The Copy Management Field employs four bits to encode a Copy Management State, as discussed above. The AACS Flag employs one bit to indicate whether the content was embedded in accordance with licensing requirements, compliance rules, and specifications established by AACS LA, LLC. The Reserved Field employs the remaining 3 bits and is unused.

The Copy Management Payload is embedded repeatedly throughout Marked Content and can be recovered completely from segments as short as five seconds. The use of all Copy Management Payload fields in Marked Content is mandatory. In the event that multiple Watermarks are embedded within the same content (for example if the Embedder function is applied to the same content more than once in series), the Copy Management Payload associated with both Watermarks will typically remain detectable.

See Ex. D, Cinavia System Specification at Section 3.1.2.

132. Sony's Media Content is produced by altering a phase of at least one of the plurality of frequency components in accordance with the data to be embedded by (1) selecting a fundamental tone and at least one overtone and (2) quantizing the phase difference of the at least one overtone relative to the fundamental tone to embed at least one bit of the data to be embedded. For example, as explained above, SPE uses embedders to select a fundamental tone and a harmonic of that fundamental tone—which is an overtone—for applying a phase shift to the harmonic to embed data in the audio signal thereby creating the watermark.

133. As a result of Sony's direct infringement of the Asserted Patent, MZ Audio has been injured by Sony's unauthorized use of MZ Audio's patented intellectual property.

134. MZ Audio seeks monetary damages in an amount adequate to compensate for Sony's infringement, but in no event less than a reasonable royalty for the use made of the invention by Sony, together with interest and costs as fixed by the Court, and MZ Audio will

continue to suffer damages in the future unless Sony's infringing activities are enjoined by this Court.

135. Unless a permanent injunction is issued enjoining Sony and their agents, servants, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the Asserted Patent, MZ Audio will be greatly and irreparably harmed.

COUNT II
(Indirect Infringement of U.S. Patent No. 7,289,961)

136. Plaintiff incorporates herein by reference the allegations set forth in paragraphs 1 through 95 of this Complaint as though fully set forth herein.

137. The Sony Defendants have infringed indirectly and continue to infringe indirectly the one or more claims of the Asserted Patent, including at least Claim 1, by active inducement under 35 U.S.C. § 271(b).

138. On information and belief, Sony had knowledge of the Asserted Patent as set forth above or, alternatively, no later than the date of this action. Sony has committed, and continues to commit, affirmative acts to encourage infringement with the intent that inducing acts would cause infringement or has been willfully blind to the possibility that their inducing acts would cause infringement by Third-Party Content Creators, including other movie studios (such as Universal Pictures, Paramount Pictures, etc.). Specifically, by integrating Cinavia detectors in Sony Blu-ray Disc players and other players, and advertising and promoting the benefits of content protection enabled by such Sony players, the Sony Defendants, including at least SGCJ, SCA, SEI, and SIEL induce Third-Party Content Creators to embed their media content with watermarks by embedding data in an audio signal using the method disclosed in Claim 1.

139. For example, Sony advertises and markets the fact that its Blu-ray Disc players incorporate Cinavia detectors.[7] Sony also provides firmware upgrades to such Sony players for their detectors, which further induces Third-Party Content Creators to embed their media content for such Sony players to use the method claimed in Claim 1 of the Asserted Patent.[8]

140. As another example, Sony has widely advocated for the use of Cinavia and has adopted Cinavia content protection across the spectrum of its content and devices. Indeed, as a leader in the Blu-ray Disc format, as a founder of the AACS LA, and as the first early adopter of Cinavia technology—Sony was influential in the adoption of Cinavia by Third-Party Content Creators, including other studios, and other members of AACS LA. Sony actively participated in AACS legal and business working groups, and influenced and guided AACS policy and strategy.

141. Based on Sony's inducing acts, to enable playing of media content on Sony's Cinavia-enabled players, Third-Party Content Creators directly infringe by embedding data in an audio signal as claimed in Claim 1 that can be detected with Sony players. Specifically, the Third-Party Content Creators directly infringe the Claim 1 method for embedding comprising: (1) dividing the audio signal into a plurality of time frames and, in each time frame, a plurality of frequency components; (2) in at least some of the time frames, selecting at least two frequency components, including selecting a fundamental tone and at least one overtone; and (3) altering the phase of at least one of the frequency components within a time frame by quantizing a phase difference of the overtone relative to the fundamental tone for embedding data.

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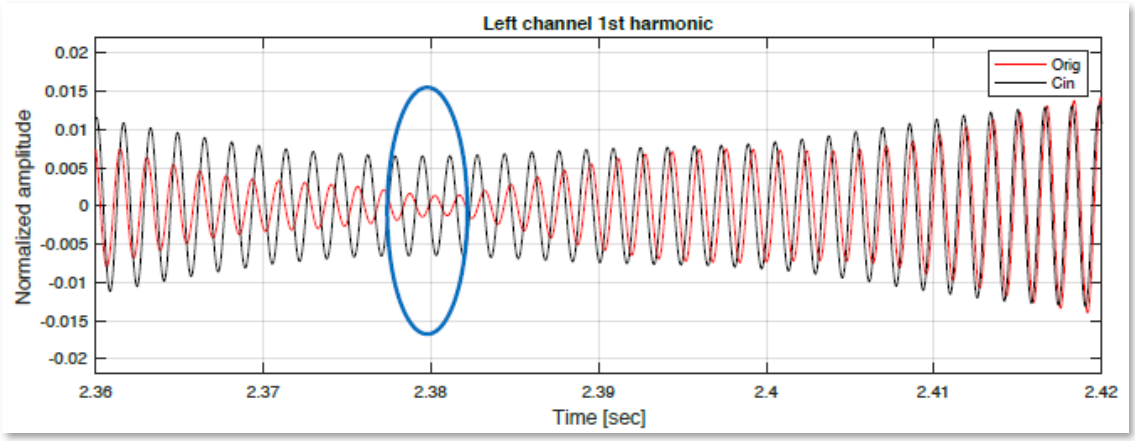
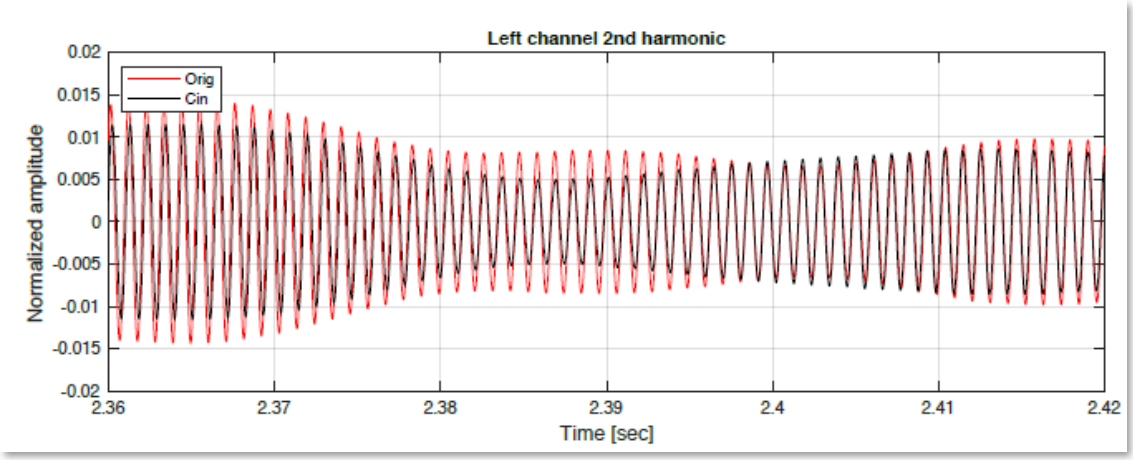
[7] *See* **Exhibit G** [What is the Cinavia technology? (https://www.sony.com/electronics/support/home-video-blu-ray-disc-players-recorders/articles/00017948)].

[8] *See*, **Exhibit H**. [Blu-ray Disc Player Firmware Upgrade (https://www.sony.com/electronics/support/home-video-blu-ray-disc-players-recorders/downloads/W0010188)].

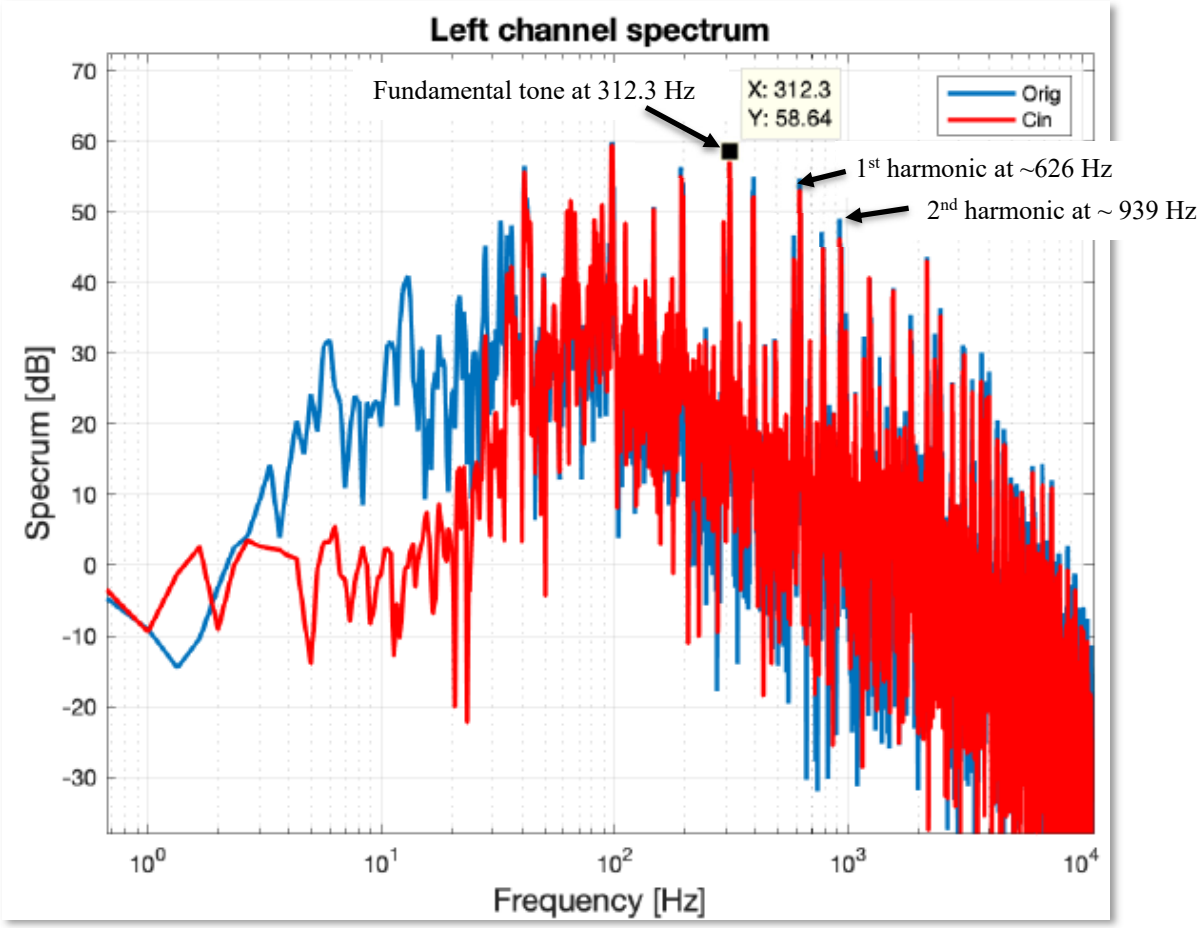
142. In particular, Sony induces Third-Party Content Creators to embed their media content using the method of Claim 1, as described *supra*, paragraphs 124-126, 129-131.

143. Further, a comparison between audio tracks from a movie on a Third-Party Content Creator-released Blu-ray Disc with Cinavia watermarking, and the same audio track without such watermarks, reveals that Third-Party Content Creator audio that is watermarked with Cinavia technology exhibits the same kind of conspicuous modification in a plurality of frequency components in a time frame, specifically a modification in the phase between a fundamental frequency and one or more harmonic frequencies, as seen in the Sony-produced audio with Cinavia in paragraph 127. For example, in the Third-Party Content comparative time waveform graph below, the harmonic at 626 Hz shows a phase change of approximately π radians at around 2.38 seconds between the harmonics in the watermark-free ("Orig") and watermarked ("Cin") versions. In contrast, the second harmonic at 939 Hz is held at a phase difference of approximately 0 radians. These conspicuous and selective phase shifts appear throughout audio watermarked with Cinavia technology.





144. To embed or encode such phase shifts, Third-Party Content Creators' production of their media content divides a time frame into a plurality of frequency components, selecting a fundamental tone and at least one overtone as shown in the figure on the following page. That figure depicts the magnitude spectrum overlay of audio waveforms from the same Third-Party movie as the figures above. The red line ("Cin") represents a waveform from a Third-Party Blu-ray Disc movie audio track with a Cinavia watermark embedded in the audio signal. The blue line ("Orig") represents a waveform from the same audio track without the watermark.



145. As a result of the Sony Defendants' indirect infringement of the Asserted Patent, Plaintiff has been injured by Sony's inducement of Third-Party Content Creators' unauthorized use of Plaintiff's intellectual property.

146. MZ Audio seeks monetary damages in an amount adequate to compensate for Sony's infringement, but in no event less than a reasonable royalty for the use made of the invention by Sony, together with interest and costs as fixed by the Court, and MZ Audio will continue to suffer future damages unless Sony's infringing activities are enjoined by this Court.

147. Unless a permanent injunction is issued enjoining Sony and their agents, servants, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the Asserted Patent, MZ Audio will be greatly and irreparably harmed.

PRAYER FOR RELIEF

Plaintiff prays for the following relief:

1. A judgment that Defendants have infringed one or more claims of the Asserted Patent;

2. A permanent injunction enjoining Defendants and their officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert or participation with Defendants, from infringing the Asserted Patent;

3. An award of damages resulting from Defendants' acts of infringement in accordance with 35 U.S.C. § 284;

4. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to Plaintiff its reasonable attorneys' fees against Defendants;

5. A judgment and order requiring Defendants to provide accountings and to pay supplemental damages to Plaintiff;

6. An award of costs and prejudgment and post-judgment interest; and

7. Any and all other relief to which Plaintiff may show itself to be entitled.

JURY TRIAL DEMANDED

Plaintiff hereby demands a trial by jury of all issues so triable.

Dated: November 24, 2021

Respectfully submitted,

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