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**UNITED STATES DISTRICT COURT**
**FOR THE CENTRAL DISTRICT OF CALIFORNIA**

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| BROADCOM CORPORATION AND AVAGO TECHNOLOGIES GENERAL IP (SINGAPORE) PTE. LTD.<br><br>Plaintiffs,<br><br>v.<br><br>SONY CORPORATION, SONY CORPORATION OF AMERICA, SONY INTERACTIVE ENTERTAINMENT, INC. AND SONY ELECTRONICS, INC.<br><br>Defendants. | Case No. 8:16-cv-1052<br><br>**COMPLAINT FOR PATENT INFRINGEMENT**<br><br>**DEMAND FOR JURY TRIAL** |

Plaintiffs Broadcom Corporation and Avago Technologies General IP (Singapore) Pte. Ltd. (collectively referred to as "Broadcom") file this Complaint for Patent Infringement of several United States patents as identified below (collectively, the "Patents-in-Suit") and allege as follows:

## PARTIES

1. Plaintiff Broadcom Corporation is a corporation formed under the laws of California with its principal place of business at 5300 California Ave., Irvine, California 92617.

2. Plaintiff Avago Technologies General IP (Singapore) Pte. Ltd. is a corporation with a tax registration number 2005-12430-D, formed under the laws of Singapore with its principal places of business at 1320 Ridder Park Dr., San Jose, California 95131 and 1 Yishun Avenue 7, Singapore 768923.

3. Defendant Sony Corporation is a Japanese corporation with its principal place of business at 7-1, Konan 1-Chome, Minato-Ku, Tokyo 108-0075.

4. Defendant Sony Corporation of America is a New York corporation with a principal place of business at 25 Madison Avenue, New York, New York 10022. Sony Corporation of America may be served through its registered agent Corporation Service Company, 80 State Street, Albany, New York 12207-2543.

5. Defendant Sony Interactive Entertainment, Inc. is a Delaware corporation with a principal place of business at 2207 Bridgepointe Parkway, San Mateo, California 94404. Sony Interactive Entertainment, Inc. may be served through its registered agent Corporation Service Company, 2711 Centerville Road, Suite 400, Wilmington, Delaware 19808.

6. Defendant Sony Electronics, Inc. is a Delaware corporation with a principal place of business at 16530 Via Esprillo, San Diego, California 92127. Sony Electronics Inc. may be

served through its registered agent Corporation Service Company, 80 State Street, Albany, New York 12207-2543.

## JURISDICTION AND VENUE

7. Broadcom brings this civil action for patent infringement under the Patent Laws of the United States, 35 U.S.C. § 1 *et. seq.*, including 35 U.S.C. §§ 271, 281-285. This Court has subject matter jurisdiction over this action under 28 U.S.C. §§ 1331 and 1338.

8. Upon information and belief, Sony Corporation, Sony Corporation of America, Sony Interactive Entertainment, Inc. and Sony Electronics, Inc. (collectively "Sony") transact and conduct business in this District and the State of California, and are subject to the personal jurisdiction of this Court. For example, Sony Electronics, Inc. is headquartered in San Diego. Sony Corporation of America is registered to do business in the State of California, and maintains a registered agent for service of process in Sacramento. Sony Interactive Entertainment, Inc.'s worldwide headquarters is located in San Mateo. Sony Corporation also conducts a substantial amount of business in the State of California, directly or through its wholly owned subsidiaries. On information and belief, Sony maintains a number of offices in this District, and employs residents of this district.

9. Sony has also availed itself of the privilege of the courts in this District by filing 10 different patent infringement lawsuits here.

10. Broadcom's causes of action arise, at least in part, from Sony's business contacts and other activities in the State of California and in this District. Upon information and belief, Sony has committed acts of infringement within this District and the State of California by making, using, selling, offering for sale, or importing into the United States products that infringe one or more claims of the Patents-in-Suit as set forth herein. Further, Sony encourages others

within this District to infringe one or more claims of the Patents-in-Suit.

11. Sony solicits customers within this District and the State of California, and has many customers who are residents of the State of California and this District who purchase and use Sony's products alleged to infringe the Patents-in-Suit.

12. Venue is proper in this District under 28 U.S.C. §§ 1391 and 1400.

## THE PATENTS-IN-SUIT

13. On February 9, 1999, the United States Patent and Trademark Office ("USPTO") duly and legally issued, after a full and fair examination, U.S. Pat. No. 5,870,087 ("the '087 patent"), titled "MPEG Decoder System and Method Having a Unified Memory for Transport Decode and System Controller Function," to inventor Kwok Kit Chau. A true and correct copy of the '087 patent is attached as Exhibit A to this Complaint.

14. On June 1, 2004, the USPTO duly and legally issued, after a full and fair examination, U.S. Pat. No. 6,744,387 ("the '387 patent"), titled "Method and System for Symbol Binarization," to inventor Lowell Winger. A true and correct copy of the '387 patent is attached as Exhibit B to this Complaint.

15. On January 3, 2006, the USPTO duly and legally issued, after a full and fair examination, U.S. Pat. No. 6,982,663 ("the '663 patent"), titled "Method and System for Symbol Binarization," to inventor Lowell Winger. A true and correct copy of the '663 patent is attached as Exhibit C to this Complaint.

16. On February 28, 2006, the USPTO duly and legally issued, after a full and fair examination, U.S. Pat. No. 7,006,636 ("the '636 patent"), titled "Coherence-Based Audio Coding and Synthesis," to inventors Frank Baumgarte and Christof Faller. A true and correct copy of the '636 patent is attached as Exhibit D to this Complaint.

17. On December 30, 2008, the USPTO duly and legally issued, after a full and fair examination, U.S. Pat. No. 7,472,151 ("the '151 patent"), titled "System and Method for Accelerating Arithmetic Decoding of Video Data," to inventor Reinhard Schumann. A true and correct copy of the '151 patent is attached as Exhibit E to this Complaint.

18. On September 1, 2009, the USPTO duly and legally issued, after a full and fair examination, U.S. Pat. No. 7,583,805 ("the '805 patent"), titled "Late Reverberation-Based Synthesis of Auditory Scenes," to inventors Frank Baumgarte and Christof Faller. A true and correct copy of the '805 patent is attached as Exhibit F to this Complaint.

19. On July 15, 2008, the USPTO duly and legally issued, after a full and fair examination, U.S. Pat. No. 7,400,643 ("the '643 patent"), titled "Transmission of Wide Bandwidth Signals in a Network Having Legacy Devices," to inventors Christopher J. Hansen, Jason A. Trachewsky, and R. Tushar Moorti. A true and correct copy of the '643 patent is attached as Exhibit G to this Complaint.

20. On November 10, 2009, the USPTO duly and legally issued, after a full and fair examination, U.S. Pat. No. 7,616,955 ("the '955 patent"), titled "Method and System for Bits and Coding Assignment Utilizing Eigen Beamforming with Fixed Rates for Closed Loop WLAN," to inventor Joonsuk Kim. A true and correct copy of the '955 patent is attached as Exhibit H to this Complaint.

21. On May 18, 2010, the USPTO duly and legally issued, after a full and fair examination, U.S. Pat. No. 7,720,294 ("the '294 patent"), titled "Unified Decoder Architecture," to inventors Ravindra Bidnur, Ramada Lakshmikanth Pai, Bhaskar Sherigar, Aniruddha Sane, Sandeep Bhatia, and Gaurava Agarwal. A true and correct copy of the '294

patent is attached as Exhibit I to this Complaint.

22. On April 3, 2012, the USPTO duly and legally issued, after a full and fair examination, U.S. Pat. No. 8,147,332 ("the '332 patent"), titled "Method of Indicating the Ordinal Number of a Player in a Wireless Gaming System," to inventor Robert W. Hulvey. A true and correct copy of the '332 patent is attached as Exhibit J to this Complaint.

**BACKGROUND**

23. In 2014, Avago Technologies Limited acquired LSI Corporation, including its substantial patent portfolio. The patent portfolio covers innovative technologies developed by LSI as well as cutting-edge technologies invented by its predecessor companies, including Agere Systems, Inc., Lucent Technologies, AT&T Corporation, and Bell Laboratories. These companies were preeminent in the semiconductor industry and at the forefront of technological innovations in this and other areas.

24. In 2016, Avago Technologies Limited acquired Broadcom Corporation, consolidating significant technological knowledge and substantial patent portfolios under the umbrella of a new parent entity, Broadcom Limited. Broadcom Corp. had long been known as an innovator of technologies for wired and wireless communication, enterprise storage, and industrial facilities. Broadcom Corp. spent billions of dollars in research and development which lead to thousands of cutting edge technologies and products. Broadcom Corp.'s significant investment in research and development also lead to its substantial patent portfolio.

25. Sony recognizes the importance of the LSI patent portfolio. Sony has licensed certain portions of the patent portfolios of LSI and its predecessor companies for five decades. Sony has been aware of Broadcom Corporation's patent portfolio since at least January 2016.

26. Sony's most recent portfolio license with LSI lapsed on March 31, 2014. Despite

continuing to use the various technological advancements provided by the LSI patent portfolio, Sony has failed to compensate Broadcom for the use of these technologies and those of Broadcom Corporation. Since April, 2015, Broadcom has made a number of attempts to resolve Sony's continued infringement amicably and has engaged in extensive licensing negotiations with Sony. But, Broadcom's efforts were unsuccessful. After numerous meetings and negotiation, Broadcom provided Sony with a written offer to license portions of its patent portfolio but received no counteroffer. Accordingly, Broadcom has now filed this lawsuit.

**COUNT 1**

**(Infringement of U.S. Pat. No. 5,870,087)**

27. Sony infringes at least claim 1 of the '087 patent under 35 U.S.C. §271(a), (b), and (c). Sony makes, uses, sells, offers to sell, or imports into the United States products, such as the PlayStation 4, that meet each and every limitation of claim 1.

28. Claim 1 of the '087 patent is directed to an MPEG decoder system which includes a single memory for use by transport, decode and system controller functions, comprising: (1) a channel receiver for receiving and [sic] MPEG encoded stream; (2) transport logic coupled to the channel receiver which demultiplexes one or more multimedia data streams from the encoded stream; (3) a system controller coupled to the transport logic which controls operations within the MPEG decoder system; (4) an MPEG decoder coupled to receive one or more multimedia data streams output from the transport logic, wherein the MPEG decoder operates to perform MPEG decoding on the multimedia data streams; and (5) a memory coupled to the MPEG decoder, wherein the memory is used by the MPEG decoder during MPEG decoding operations, wherein the memory stores code and data useable by the system controller which enable the system controller to perform control functions within the MPEG decoder system, wherein the

memory is used by the transport logic for demultiplexing operations; (6) wherein the MPEG decoder is operable to access the memory during MPEG decoding operations; (7) wherein the transport logic is operable to access the memory to store and retrieve data during demultiplexing operations; and (8) wherein the system controller is operable to access the memory to retrieve code and data during system control functions.

29. Sony's products infringe at least claim 1 of the '087 patent. The PlayStation 4 includes a system controller and graphics processor that are capable of decoding video and other data. For example, the PlayStation 4 includes an AMD Jaguar 8 core CPU and an AMD Radeon Graphics processor. The PlayStation 4 is further capable of decoding MPEG encoded data. The encoded data stream typically consists of audio, video, and program and system information protocol data, which is separated and processed by the system. The system controller and graphics processor receive encoded video data, for example, from discs that are inserted into the PlayStation 4. The PlayStation 4 includes memory that is used by the system to store and separate the MPEG or other encoded data from the inserted discs and also to transport the information to the graphics processor. On information and belief, the memory is also used by the system controller and graphics processor for decoding and other system level functions that ultimately lead to presenting the information to the viewer.

30. On information and belief, other Sony products similarly infringe one or more claims of the '087 patent. Such other products include Sony's digital TVs, PlayStation 3, and Blu-Ray players.

31. Sony also induces and contributes to the infringement by its customers of at least claim 1 of the '087 patent. Sony promotes and advertises the use of its products, especially their

capabilities to decode audio and video media. Examples of Sony's promotional materials appear on the company's website. Sony encourages its customers to purchase its products for no other purpose than for those customers to use the products to decode and present encoded media. Because Sony's products include an infringing architecture used to decode MPEG or other encoded video data, the products have no substantial non-infringing uses.

32. Sony has had notice of the '087 patent and its infringement of the '087 patent since at least April 16, 2015.

33. Sony continues to infringe one or more claims of the '087 patent, despite being aware of its infringement. Sony's infringement has been, and continues to be, willful and deliberate, and has caused substantial damage to Broadcom.

**COUNT 2**

**(Infringement of U.S. Pat. No. 6,744,387)**

34. Sony infringes at least claim 3 of the '387 patent under at least 35 U.S.C. §271(a) and (b). Sony makes, uses, sells, offers to sell, or imports into the United States products, such as its PlayStation 4, that meet each and every limitation of claim 3.

35. Claim 3 of the '387 patent is directed to a binarization system comprising: (1) means for determining if a code symbol index value is less than a threshold value; (2) means for constructing a codeword using a unary binarization if said code symbol index value is less than said threshold value; and (3) means for constructing a codeword using a exp-Golomb binarization if said code symbol index value is not less than said threshold value.

36. Sony's products, such as its PlayStation 4, are capable of encoding video information in accordance with the MPEG-4 standard, set forth by the Motion Pictures Expert Group. Certain portions of the MPEG standards are also adopted by the standards and

recommendations provided by the International Telecommunications Union's Standardization Sector (ITU-T). The PlayStation 4, for example, supports H.264, which is provided by the ITU-T. The encoding methodology claimed by the '387 patent allows Sony's products to reduce file size or bit rate required by the system. Other Sony products, such as PlayStation 3 and the Alpha 6000 camera, also infringe at least one claim of the '387 patent.

37. The PlayStation 4 includes hardware and software for encoding video using context-adaptive binary arithmetic coding ("CABAC"). CABAC is incorporated into the standards adopted by MPEG and ITU-T. For example, consistent with certain profiles of the H.264 standard, PlayStation 4's hardware and software include a binarization system that determines a value for the content that is to be encoded. In the case of CABAC encoded H.264 data, the system utilizes unary exp-Golomb binarization as part of the process to encode the content.

38. Sony also induces infringement by its customers of at least claim 3 of the '387 patent. Sony promotes and advertises the use of its products, especially their capabilities to encode H.264 video data. Examples of Sony's promotional materials appear on the company's website. Sony encourages its customers to purchase its products for no other purpose than for those customers to use the products for encoding and decoding video data.

39. Sony has had notice of the '387 patent and of its infringement of the '387 patent since at least April 16, 2015.

40. Sony continues to infringe one or more claims of the '387 patent, despite being aware of its infringement. Sony's infringement has been, and continues to be, willful and deliberate, and has caused substantial damage to Broadcom.

## COUNT 3

**(Infringement of U.S. Pat. No. 6,982,663)**

41. Sony infringes at least claims 11 and 21 of the '663 patent under at least 35 U.S.C. §271(a) and (b). Sony makes, uses, sells, offers to sell, or imports into the United States products, such as its PlayStation 4, that meet each and every limitation of claims 11 and 21.

42. Claim 11 of the '663 patent is directed to a system comprising: (1) a decoder configured to generate a codeword; and (2) a circuit configured to (a) set an index value to a threshold in response to a first portion of the codeword having a first pattern, (b) add an offset to the index value based on a second pattern in a second portion of the codeword following the first portion in response to the first portion having a first pattern, and (c) add a value to the index value based on a third pattern in a third portion of the codeword following the second portion in response to the first portion having the first pattern.

43. Claim 21 is of the '663 patent is directed to a system comprising: (1) a circuit configured to (a) generate a first pattern in a first portion of a codeword in response to an index value being at least as great as a certain threshold, (b) generate a second pattern in a second portion of the codeword following the first portion representing an offset of the index value above the threshold, and (c) generate a third pattern in a third portion of the codeword following the second portion representing a value of the index value above the offset; and (2) an encoder configured to encode the codeword.

44. Sony's products, such as its PlayStation 4, are capable of encoding and decoding video information in accordance with the MPEG-4 standard, set forth by the Motion Pictures Expert Group. Certain portions of the MPEG standards are also adopted by the standards and recommendations provided by the International Telecommunications Union's Standardization

Sector (ITU-T). The PlayStation 4, for example, supports H.264, which is provided by the ITU-T. The encoding and decoding methodology claimed by the '663 patent allows Sony's products to reduce file size or bit rate required by the system. Other Sony products, such as the Alpha 6000 camera, PlayStation 3, Blu-Ray players, and digital TVs, also infringe at least one claim of the '663 patent.

45. The PlayStation 4 includes hardware and software for encoding video data using CABAC. CABAC is incorporated into the standards adopted by MPEG and ITU-T. For example, consistent with certain profiles of the H.264 standard, PlayStation 4's hardware and software infringes claim 21 of the '663 patent because it includes a binarization system that generates a codeword for the content that is to be encoded. The system utilizes unary exp-Golomb binarization as part of the process to encode the content. The PlayStation 4 also includes an encoder that encodes the content.

46. PlayStation 4 includes hardware and software for decoding video data encoded using CABAC. PlayStation 4 infringes claim 11 of the '663 patent because it includes a system comprising a decoder configured to generate a codeword and a circuit that is able to read the various patterns in the encoded data to generate a value associated with the original content as part of the process to decode the encoded data.

47. Sony also induces the infringement by its customers of claims 11 and 21 of the '663 patent. Sony promotes and advertises the use of its products, especially their capabilities to encode and decode video data. Examples of Sony's promotional materials appear on the company's website. Sony encourages its customers to purchase its products for no other purpose than for those customers to use the products to encode and decode video data.

48. Sony has had notice of the '663 patent and of its infringement of the '663 patent since at least April 16, 2015.

49. Sony continues to infringe one or more claims of the '663 patent, despite being aware of its infringement. Sony's infringement has been, and continues to be, willful and deliberate, and has caused substantial damage to Broadcom.

**COUNT 4**

**(Infringement of U.S. Pat. No. 7,006,636)**

50. Sony infringes at least claim 23 of the '636 patent under at least 35 U.S.C. §271(a) and (b). Sony makes, uses, sells, offers to sell, or imports into the United States products, such as its Blu-Ray disc players, that meet each and every limitation of at least claim 23.

51. Claim 23 of the '636 patent is directed to an apparatus for synthesizing an auditory scene, comprising: (1) a time-frequency transformer configured to convert an input audio signal from a time domain into one or more frequency bands in a frequency domain, wherein each band comprises a plurality of sub-bands; (2) an auditory scene synthesizer configured to apply an auditory scene parameter to each band to generate two or more output audio signals, wherein the auditory scene parameter is modified for each different sub-band in the band based on a coherence value, wherein the coherence value is related to perceived width of a synthesized audio source corresponding to the two or more output audio signals; and (3) one or more inverse time-frequency transformers configured to convert the two or more output audio signals from the frequency domain into the time domain.

52. Sony's products, such as its BDP-S7200 Blu-Ray disc player, are capable of decoding audio data to effectively synthesize an audio scene. Sony's Blu-Ray disc players are capable of decoding MPEG-4 part 3 encoded audio that uses parametric stereo encoding to

synthesize audio scenes that allow the listener to perceive the spatial location of the various audio sources within the scene. The encoding mechanism utilizes coherence and associated parameters to encode the audio scene. Decoders are then able to decode and process this information to synthesize the scene. The MPEG-4 part 3 compliant decoders, such as those used in Sony's Blu-Ray disc players, include hardware and/or software that convert incoming audio data from the time domain into the frequency domain and apply the parameters to generate audio signals that recreate the audio sources within a scene. The MPEG-4 part 3 compliant products also include hardware and/or software to covert the frequency domain signals back into the time domain. The resulting audio output is able to recreate, for the listener, the original audio scene as was encoded.

53. On information and belief, other Sony products similarly infringe one or more claims of the '636 patent. Such products include Sony's digital TVs, PlayStation products, audio receivers, and Walkman products.

54. Sony also induces infringement by its customers of at least claim 23 of the '636 patent. Sony promotes and advertises the use of its products, especially their capabilities to decode audio and video media. Examples of Sony's promotional materials appear on the company's website. Sony encourages its customers to purchase its products for no other purpose than for those customers to use the products to decode and present the encoded media.

55. Sony has had notice of the '636 patent and of its infringement of the '636 patent since at least April 16, 2015.

56. Sony continues to infringe one or more claims of the '636 patent, despite being aware of its infringement. Sony's infringement has been, and continues to be, willful and

deliberate, has caused substantial damage to Broadcom.

**COUNT 5**

**(Infringement of U.S. Pat. No. 7,583,805)**

57. Sony infringes at least claim 36 of the '805 patent under at least 35 U.S.C. §271(a) and (b). Sony makes, uses, sells, offers to sell, or imports into the United States products, such as its Blu-Ray disc players, that meet each and every limitation of at least claim 36.

58. Claim 36 of the '805 patent is directed to an apparatus for synthesizing an auditory scene, comprising: (1) a configuration of at least one time domain to frequency domain (TD-FD) converter and a plurality of filters, the configuration adapted to generate two or more processed FD input signals and two or more diffuse FD signals from at least one TD input channel; (2) two or more combiners adapted to combine the two or more diffuse FD signals with the two or more processed FD input signals to generate a plurality of synthesized FD signals; and (3) two or more frequency domain to time domain (FD-TD) converters adapted to convert the synthesized FD signals into a plurality of TD output channels for the auditory scene, wherein: (a) the configuration comprises: (i) a first TD-FD converter adapted to convert the at least one TD input channel into a plurality of FD input signals; (ii) a plurality of delay nodes adapted to delay the FD input signals to generate a plurality of delayed FD signals; and (iii) a plurality of multipliers adapted to scale the delayed FD signals to generate a plurality of scaled, delayed FD signals; (b) the delay nodes are adapted to delay the FD input signals based on inter-channel time difference (ICTD) data; and (c) the multipliers are adapted to scale the delayed FD signals based on inter-channel level difference (ICLD) and inter-channel correlation (ICC) data.

59. Sony's products, such as its BDP-S7200 Blu-Ray disc player, are capable of decoding audio data to effectively synthesize an audio scene. Sony's Blu-Ray disc players are

capable of decoding MPEG-4 part 3 encoded audio that uses parametric stereo encoding to synthesize audio scenes that allow the listener to perceive the spatial location of the various audio sources within the scene. This encoding also accounts for the fact that audio signals generally reach a listener's ears at different times with different audio levels. The encoding and decoding mechanisms utilize the difference in level, time, and coherence between various channels of the audio data to synthesize the audio scene. The MPEG-4 part 3 compliant decoders, such as those included in Sony's Blu-Ray disc players, include hardware and/or software that convert and filter incoming audio data from the time domain into the frequency domain. Additionally, the products include hardware and/or software to process and combine the frequency domain signals, including delaying and scaling certain signals based on the level, time, and coherence differences to allow the products to ultimately decode the encoded audio scene. The MPEG-4 part 3 compliant products also include hardware and/or software to convert the frequency domain signals back into the time domain. The resulting audio output is able to recreate, for the listener, the encoded audio scene.

60. On information and belief, other Sony products similarly infringe one or more claims of the '805 patent. Such products include Sony's digital TVs, audio receivers, PlayStation products, and Walkman products.

61. Sony also induces the infringement by its customers of at least claim 36 of the '805 patent. Sony promotes and advertises the use of its products, especially their capabilities to decode audio and video media. Examples of Sony's promotional materials appear on the company's website. Sony encourages its customers to purchase its products for no other purpose than for those customers to use the products to decode and present the encoded media.

62. Sony has notice of the '805 patent and of its infringement of the '805 patent through at least the filing and service of this Complaint.

63. Sony's infringement has caused and continues to cause substantial damage to Broadcom.

**COUNT 6**

**(Infringement of U.S. Pat. No. 7,472,151)**

64. Sony infringes at least claim 6 of the '151 patent at least under 35 U.S.C. §271(a) and (b). Sony makes, uses, sells, offers to sell, or imports into the United States products, such as its PlayStation 4, that meet each and every limitation of at least claim 6.

65. Claim 6 of the '151 patent is directed to a decoder for decoding context adaptive binary coded data, comprising: (1) a first memory for receiving at a channel rate, a bitstream comprising the context adaptive binary coded data; (2) a context adaptive binary arithmetic coded data decoding loop for decoding the context adaptive binary arithmetic coded data at the channel rate, the context adaptive binary arithmetic coded data decoding loop comprising an arithmetic decoder for generating bins from the context adaptive binary arithmetic coded data at the channel rate; and (3) a syntax assembler for decoding the bins at a consumption rate, thereby generating syntax elements, wherein the context adaptive binary arithmetic coded data encodes video data, and wherein the consumption rate corresponds to a display rate of the encoded video data.

66. Sony's products, such as its PlayStation 4, are capable of decoding video information in accordance with the MPEG-4 standard, set forth by the Motion Pictures Expert Group. Certain portions of the MPEG standards are also adopted by the standards and recommendations provided by the International Telecommunications Union's Standardization

Sector (ITU-T). The PlayStation 4, for example, supports H.264, which is provided by the ITU-T. The decoding methodology claimed by the '151 patent allows Sony's products to accelerate arithmetic decoding of encoded data. Other Sony products, such as its PlayStation 3, digital TVs and Blu-Ray players, also infringe at least one claim of the '151 patent.

67. For example, the PlayStation 4 includes hardware and software for decoding H.264 video encoded with CABAC. CABAC is incorporated into the standards adopted by MPEG and ITU-T. The PlayStation 4 includes a memory for receiving CABAC encoded data, and a decoder for decoding the received data. The decoder continuously decodes the CABAC encoded data bit-by-bit and generates bins of data from the CABAC encoded data at a rate consistent with the rate at which the CABAC encoded data is received. The PlayStation 4's decoder further includes hardware and software to decode the bins to recreate the original video content at a rate consistent with the display rate for the encoded video data.

68. Sony also induces infringement by its customers of at least claim 6 of the '151 patent. Sony promotes and advertises the use of its products, especially their capabilities to decode video data. Examples of Sony's promotional materials appear on the company's website. Sony encourages its customers to purchase its products for no other purpose than for those customers to use the products for encoding and decoding video data.

69. Sony has notice of the '151 patent and of its infringement at least through the filing and service of the Complaint.

70. Sony's infringement has caused and will continue to cause substantial damage to Broadcom.

**COUNT 7**

**(Infringement of U.S. Pat. No. 7,400,643)**

71. Sony infringes at least claim 6 of the '643 patent under at least 35 U.S.C. §271(a), (b), and (c). Sony makes, uses, sells, offers to sell, or imports into the United States products, such as its PlayStation 4, that meet each and every limitation of at least claim 6.

72. Claim 6 of the '643 patent is directed to a radio frequency (RF) transmitter comprising: (1) a baseband processing module operably coupled to convert outbound data into an outbound symbol stream; and (2) a transmitter section operably coupled to convert the outbound symbol stream into outbound RF signals, wherein the baseband processing module is operably coupled to: (a) determine channel bandwidth of a channel that supports the wide bandwidth signals in the network; (b) determine overlap of legacy channel bandwidth with the channel bandwidth of the channel; and (c) provide a legacy readable preamble portion as part of a frame transmitted within the channel wherein a legacy device is operable to interpret the legacy readable preamble portion but not operable to interpret remaining portions of the frame.

73. Sony's products, such as its PlayStation 4, include a radio frequency transmitter for communicating in a wireless local area network ("WLAN"). The PlayStation 4 complies with certain standards for implementing and communicating within a WLAN, such as those adopted by the Institute of Electrical and Electronics Engineers ("IEEE") in its 802.11n and 802.11ac standards. The PlayStation 4's transmitter includes hardware and software that provides for the conversion of outbound data and transmission in 40 MHz high throughput (HT) format as set forth in 802.11n or very high throughput (VHT) format as set forth in 802.11ac. Further, in accordance with the standards, legacy transmissions may occur in 20 MHz subchannels of a wideband 40 MHz channel. Additionally, the transmitter includes hardware

and software to provide a legacy readable preamble as part of the information transmitted to allow legacy devices to interpret the legacy preamble.

74. Other Sony products similarly infringe one or more claims of the '643 patent. Such other products include Sony's digital TV products, cameras, camcorders, audio receivers, Blu-Ray and other media players, and other PlayStation products.

75. Sony also induces and contributes to the infringement by its customers of at least claim 6 of the '643 patent. Sony promotes and advertises the use of its products, especially their capabilities to communicate wirelessly in local networks. Examples of Sony's promotional materials appear on the company's website. Sony encourages its customers to purchase its WiFi enabled products for no other purpose than for those customers to use the wireless transmitter to communicate with other devices in the network. Accordingly, the transmitters within the products have no substantial non-infringing uses.

76. Sony has notice of the '643 patent and of its infringement at least through the filing and service of the Complaint.

77. Sony's infringement has caused and will continue to cause substantial damage to Broadcom.

## COUNT 8

**(Infringement of U.S. Pat. No. 7,616,955)**

78. Sony infringes at least claim 21 of the '955 patent under at least 35 U.S.C. §271(a), (b), and (c). Sony makes, uses, sells, offers to sell, or imports into the United States products, such as its PlayStation 4, that meet each and every limitation of at least claim 21.

79. Claim 21 is directed to a system for communicating information in a communication system, comprising: (1) a transmitter that is operable to concurrently transmit, to

a single receiving device, data via a plurality of RF channels utilizing a plurality of transmitting antennas; (2) said transmitter is operable to receive feedback information related to said plurality of RF channels; (3) said transmitter is operable to assign bits for transmission via said plurality of transmitting antennas based on said feedback information; and (4) said transmitter is operable to transmit at least a portion of subsequent data having at least a first coding rate based on said assignment of bits via said at least one of said plurality of RF channels.

80. Sony's products, such as its PlayStation 4, include a radio frequency transmitter for communicating in a WLAN. The PlayStation 4 complies with certain standards for implementing and communicating within a WLAN, such as those adopted by the IEEE 802.11n and 802.11ac standards. The PlayStation 4's transmitter includes at least two antennas and in compliance with the standards, supports the high throughput PHY specification as set forth in 802.11n and very high throughput PHY specification as set forth in 802.11ac. Further, in accordance with the standards, the transmitter is capable of receiving beamforming feedback. On information and belief, such feedback is used to assign bits for transmission and the device transmits at least a portion of subsequent data based on the assignment of bits. The high throughput and very high throughput data subcarriers are modulated using binary phase shift keying, quadrature phase shift keying, 16-quadrature amplitude modulation ("QAM"), 64-QAM, and 256-QAM. Additionally, forward error correction coding is used with certain coding rates.

81. Other Sony products similarly infringe one or more claims of the '955 patent. Such other products include Sony's digital TV products, cameras, camcorders, audio receivers, Blu-Ray and other media players, and PlayStation 3 and other PlayStation products.

82. Sony also induces and contributes to the infringement by its customers of at least claim 21 of the '955 patent. Sony promotes and advertises the use of its products, especially their capabilities to communicate wirelessly in local networks. Examples of Sony's promotional materials appear on the company's website. Sony encourages its customers to purchase its WiFi enabled products for no other purpose than for those customers to use the wireless transmitter to communicate with other devices in the network. Accordingly, the transmitters within the products have no substantial non-infringing uses.

83. Sony has notice of the '955 patent and of its infringement at least through the filing and service of the Complaint.

84. Sony's infringement has caused and will continue to cause substantial damage to Broadcom.

**COUNT 9**

**(Infringement of U.S. Pat. No. 7,720,294)**

85. Sony infringes at least claim 1 of the '294 patent under at least 35 U.S.C. §271(a) and (b). Sony makes, uses, sells, offers to sell, or imports into the United States products, such as its PlayStation 4, that meet each and every limitation of at least claim 1.

86. Claim 1 of the '294 patent is directed to a system for decoding video data encoded with a particular standard, comprising: (1) a video decoder for decoding the video data encoded with the particular standard, wherein the video decoder comprises a master processor; (2) instruction memory for storing: (a) a first set of instructions for decoding encoded video data according to a first encoding standard; and (b) a second set of instructions for decoding encoded video data according to a second encoding standard; (3) a host processor for providing an indication to the video decoder indicating the particular encoding standard, wherein the video

decoder, comprising the master processor, for decoding the video data encoded with the particular standard is discrete from the host processor; and (4) wherein the video decoder executes the first set of instructions if the indication indicates that the particular encoding standard is the first encoding standard and executes the second set of instructions if the indication indicates that the particular encoding standard is the second encoding standard.

87. Sony's products, such as its PlayStation 4, includes a multi standard video decoder for decoding encoded video. The PlayStation 4 includes memory that stores instructions for decoding video in accordance with a number of different standards, such as standards adopted by MPEG and ITU-T, among others. Further, the video decoder within the PlayStation 4 includes the AMD Radeon graphics processing unit and the AMD Jaguar central processing unit. The system processor is capable of identifying the standard under which the video data was encoded and the graphics processor is capable of decoding the encoded data using instructions stored in memory for decoding data under that particular standard.

88. On information and belief, other Sony products similarly infringe one or more claims of the '294 patent. Such other products include Sony's PlayStation 3 and digital TVs.

89. Sony also induces infringement by its customers of at least claim 1 of the '151 patent. Sony promotes and advertises the use of its products, especially their capabilities to decode video data. Examples of Sony's promotional materials appear on the company's website. Sony encourages its customers to purchase its products for no other purpose than for those customers to use the products for decoding video data.

90. Sony has notice of the '294 patent and of its infringement at least through the filing and service of the Complaint.

91. Sony's infringement has caused and will continue to cause substantial damage to Broadcom.

**COUNT 10**

**(Infringement of U.S. Pat. No. 8,147,332)**

92. Sony infringes at least claim 12 of the '332 patent under at least 35 U.S.C. §271(a) and (b). Sony makes, uses, sells, offers to sell, or imports into the United States products, such as its PlayStation 4 and DualShock 4 controller, that meet each and every limitation of at least claim 12.

93. Claim 12 of the '332 patent is directed to a game controller device for wirelessly communicating with a computer system, comprising: (1) a portable housing; (2) one or more input keys or analog joysticks for generating one or more control signals for controlling player actions in a video game executing on the computer system; (3) an integrated radio frequency transceiver and antenna for wirelessly exchanging control signals with the computer system; and (4) a plurality of colored indicator lights of different colors, in which one of the colored indicator lights of a particular color is lit and matches a color on the computer system to indicate by matching colors which corresponding player in a video game is controlled by the game controller device.

94. Sony's PlayStation 4 and its DualShock 4 controller include, among other things, buttons and joysticks that control player actions in video games, an interface that allows the wireless controller to communicate with the base system, and a light bar having different colored lights that are capable of changing colors to provide the user the ability to identify the particular player that controller is controlling. For example, in multiplayer games, the DualShock 4 controller uses a blue, red, green, or pink color that corresponds with the color of the player being

controlled by that controller in the video game.

95. Sony also induces infringement by its customers of at least claim 12 of the '332 patent. Sony promotes and advertises the use of its products, especially their capabilities to use the light bar on the controller in conjunction with video games. Examples of Sony's promotional materials appear on the company's website. Sony encourages its customers to purchase its products for no other purpose than for those customers to use the products to play video games. Further, the light bars are used and on by default.

96. Sony has had knowledge of the '332 patent and of its infringement of the '332 patent since at least the filing and service of this Complaint.

97. Sony's infringement has caused and continues to cause substantial damage to Broadcom.

**PRAYER FOR RELIEF**

Broadcom requests that judgment be entered in its favor and against Sony as follows:

a. Entering judgment declaring that Sony has infringed one or more claims of the Patents-in-Suit in violation of 35 U.S.C. §271;

b. Declaring that Sony's infringement of the '087, '387, '663, and '636 patents is willful and deliberate pursuant to 35 U.S.C. §284;

c. Enjoining Sony from further infringing the '151, '294, '332, and '955 patents;

d. Ordering that Broadcom be awarded damages in an amount no less than a reasonable royalty for each asserted patent arising out of Sony's infringement of the Patents-in-Suit, together with any other monetary amounts recoverable by Broadcom, such as treble damages;

e. Declaring this an exceptional case under 35 U.S.C. §285 and awarding attorneys' fees; and

f. Awarding Broadcom such other costs and further relief as the Court deems just and proper.

## DEMAND FOR JURY TRIAL

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, Broadcom demands a trial by jury on all issues so triable.

Dated: June 6, 2016

Respectfully submitted by:

/s/ Bruce J. Zabarauskas

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