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

19 BROADCOM CORPORATION AND  
 20 AVAGO TECHNOLOGIES GENERAL IP  
 (SINGAPORE) PTE. LTD.

21 Plaintiffs,

22 v.

23  
 24 SONY CORPORATION,  
 SONY CORPORATION OF AMERICA,  
 25 SONY INTERACTIVE ENTERTAINMENT, INC. AND  
 26 SONY ELECTRONICS, INC.

27 Defendants.

Case No. 8:16-cv-1052

**COMPLAINT FOR PATENT  
 INFRINGEMENT**

**DEMAND FOR JURY TRIAL**

1 Plaintiffs Broadcom Corporation and Avago Technologies General IP (Singapore) Pte.  
2 Ltd. (collectively referred to as “Broadcom”) file this Complaint for Patent Infringement of  
3 several United States patents as identified below (collectively, the “Patents-in-Suit”) and allege  
4 as follows:  
5

6 **PARTIES**

7 1. Plaintiff Broadcom Corporation is a corporation formed under the laws of  
8 California with its principal place of business at 5300 California Ave., Irvine, California 92617.  
9

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

14 3. Defendant Sony Corporation is a Japanese corporation with its principal place of  
15 business at 7-1, Konan 1-Chome, Minato-Ku, Tokyo 108-0075.  
16

17 4. Defendant Sony Corporation of America is a New York corporation with a  
18 principal place of business at 25 Madison Avenue, New York, New York 10022. Sony  
19 Corporation of America may be served through its registered agent Corporation Service  
20 Company, 80 State Street, Albany, New York 12207-2543.  
21

22 5. Defendant Sony Interactive Entertainment, Inc. is a Delaware corporation with a  
23 principal place of business at 2207 Bridgepointe Parkway, San Mateo, California 94404. Sony  
24 Interactive Entertainment, Inc. may be served through its registered agent Corporation Service  
25 Company, 2711 Centerville Road, Suite 400, Wilmington, Delaware 19808.  
26

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

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

3  
4 **JURISDICTION AND VENUE**

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

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

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

20 10. Broadcom’s causes of action arise, at least in part, from Sony’s business contacts  
21 and other activities in the State of California and in this District. Upon information and belief,  
22 Sony has committed acts of infringement within this District and the State of California by  
23 making, using, selling, offering for sale, or importing into the United States products that infringe  
24 one or more claims of the Patents-in-Suit as set forth herein. Further, Sony encourages others  
25  
26  
27  
28

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

2 11. Sony solicits customers within this District and the State of California, and has  
3 many customers who are residents of the State of California and this District who purchase and  
4 use Sony's products alleged to infringe the Patents-in-Suit.  
5

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

7 **THE PATENTS-IN-SUIT**

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

14 14. On June 1, 2004, the USPTO duly and legally issued, after a full and fair  
15 examination, U.S. Pat. No. 6,744,387 ("the '387 patent"), titled "Method and System for  
16 Symbol Binarization," to inventor Lowell Winger. A true and correct copy of the '387 patent is  
17 attached as Exhibit B to this Complaint.  
18

19 15. On January 3, 2006, the USPTO duly and legally issued, after a full and fair  
20 examination, U.S. Pat. No. 6,982,663 ("the '663 patent"), titled "Method and System for  
21 Symbol Binarization," to inventor Lowell Winger. A true and correct copy of the '663 patent is  
22 attached as Exhibit C to this Complaint.  
23

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

1           17.     On December 30, 2008, the USPTO duly and legally issued, after a full and fair  
2 examination, U.S. Pat. No. 7,472,151 (“the ’151 patent”), titled “System and Method for  
3 Accelerating Arithmetic Decoding of Video Data,” to inventor Reinhard Schumann. A true and  
4 correct copy of the ’151 patent is attached as Exhibit E to this Complaint.  
5

6           18.     On September 1, 2009, the USPTO duly and legally issued, after a full and fair  
7 examination, U.S. Pat. No. 7,583,805 (“the ’805 patent”), titled “Late Reverberation-Based  
8 Synthesis of Auditory Scenes,” to inventors Frank Baumgarte and Christof Faller. A true and  
9 correct copy of the ’805 patent is attached as Exhibit F to this Complaint.  
10

11           19.     On July 15, 2008, the USPTO duly and legally issued, after a full and fair  
12 examination, U.S. Pat. No. 7,400,643 (“the ’643 patent”), titled “Transmission of Wide  
13 Bandwidth Signals in a Network Having Legacy Devices,” to inventors Christopher J. Hansen,  
14 Jason A. Trachewsky, and R. Tushar Moorti. A true and correct copy of the ’643 patent is  
15 attached as Exhibit G to this Complaint.  
16

17           20.     On November 10, 2009, the USPTO duly and legally issued, after a full and fair  
18 examination, U.S. Pat. No. 7,616,955 (“the ’955 patent”), titled “Method and System for Bits  
19 and Coding Assignment Utilizing Eigen Beamforming with Fixed Rates for Closed Loop  
20 WLAN,” to inventor Joonsuk Kim. A true and correct copy of the ’955 patent is attached as  
21 Exhibit H to this Complaint.  
22

23           21.     On May 18, 2010, the USPTO duly and legally issued, after a full and fair  
24 examination, U.S. Pat. No. 7,720,294 (“the ’294 patent”), titled “Unified Decoder  
25 Architecture,” to inventors Ravindra Bidnur, Ramada Lakshmikanth Pai, Bhaskar Sherigar,  
26 Aniruddha Sane, Sandeep Bhatia, and Gaurava Agarwal. A true and correct copy of the ’294  
27  
28

1 patent is attached as Exhibit I to this Complaint.

2 22. On April 3, 2012, the USPTO duly and legally issued, after a full and fair  
3 examination, U.S. Pat. No. 8,147,332 (“the ’332 patent”), titled “Method of Indicating the  
4 Ordinal Number of a Player in a Wireless Gaming System,” to inventor Robert W. Hulvey. A  
5 true and correct copy of the ’332 patent is attached as Exhibit J to this Complaint.  
6

7 **BACKGROUND**

8 23. In 2014, Avago Technologies Limited acquired LSI Corporation, including its  
9 substantial patent portfolio. The patent portfolio covers innovative technologies developed by  
10 LSI as well as cutting-edge technologies invented by its predecessor companies, including Agere  
11 Systems, Inc., Lucent Technologies, AT&T Corporation, and Bell Laboratories. These  
12 companies were preeminent in the semiconductor industry and at the forefront of technological  
13 innovations in this and other areas.  
14

15 24. In 2016, Avago Technologies Limited acquired Broadcom Corporation,  
16 consolidating significant technological knowledge and substantial patent portfolios under the  
17 umbrella of a new parent entity, Broadcom Limited. Broadcom Corp. had long been known as an  
18 innovator of technologies for wired and wireless communication, enterprise storage, and  
19 industrial facilities. Broadcom Corp. spent billions of dollars in research and development which  
20 lead to thousands of cutting edge technologies and products. Broadcom Corp.’s significant  
21 investment in research and development also lead to its substantial patent portfolio.  
22

23 25. Sony recognizes the importance of the LSI patent portfolio. Sony has licensed  
24 certain portions of the patent portfolios of LSI and its predecessor companies for five decades.  
25 Sony has been aware of Broadcom Corporation’s patent portfolio since at least January 2016.  
26  
27

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

1 continuing to use the various technological advancements provided by the LSI patent portfolio,  
2 Sony has failed to compensate Broadcom for the use of these technologies and those of Broadcom  
3 Corporation. Since April, 2015, Broadcom has made a number of attempts to resolve Sony's  
4 continued infringement amicably and has engaged in extensive licensing negotiations with Sony.  
5 But, Broadcom's efforts were unsuccessful. After numerous meetings and negotiation,  
6 Broadcom provided Sony with a written offer to license portions of its patent portfolio but  
7 received no counteroffer. Accordingly, Broadcom has now filed this lawsuit.  
8

9  
10 **COUNT 1**

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

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

15 28. Claim 1 of the '087 patent is directed to an MPEG decoder system which includes  
16 a single memory for use by transport, decode and system controller functions, comprising: (1) a  
17 channel receiver for receiving and [sic] MPEG encoded stream; (2) transport logic coupled to the  
18 channel receiver which demultiplexes one or more multimedia data streams from the encoded  
19 stream; (3) a system controller coupled to the transport logic which controls operations within  
20 the MPEG decoder system; (4) an MPEG decoder coupled to receive one or more multimedia  
21 data streams output from the transport logic, wherein the MPEG decoder operates to perform  
22 MPEG decoding on the multimedia data streams; and (5) a memory coupled to the MPEG  
23 decoder, wherein the memory is used by the MPEG decoder during MPEG decoding operations,  
24 wherein the memory stores code and data useable by the system controller which enable the  
25 system controller to perform control functions within the MPEG decoder system, wherein the  
26  
27  
28

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

7           29. Sony's products infringe at least claim 1 of the '087 patent. The PlayStation 4  
8 includes a system controller and graphics processor that are capable of decoding video and other  
9 data. For example, the PlayStation 4 includes an AMD Jaguar 8 core CPU and an AMD Radeon  
10 Graphics processor. The PlayStation 4 is further capable of decoding MPEG encoded data. The  
11 encoded data stream typically consists of audio, video, and program and system information  
12 protocol data, which is separated and processed by the system. The system controller and  
13 graphics processor receive encoded video data, for example, from discs that are inserted into the  
14 PlayStation 4. The PlayStation 4 includes memory that is used by the system to store and  
15 separate the MPEG or other encoded data from the inserted discs and also to transport the  
16 information to the graphics processor. On information and belief, the memory is also used by the  
17 system controller and graphics processor for decoding and other system level functions that  
18 ultimately lead to presenting the information to the viewer.  
19  
20  
21

22           30. On information and belief, other Sony products similarly infringe one or more  
23 claims of the '087 patent. Such other products include Sony's digital TVs, PlayStation 3, and  
24 Blu-Ray players.  
25

26           31. Sony also induces and contributes to the infringement by its customers of at least  
27 claim 1 of the '087 patent. Sony promotes and advertises the use of its products, especially their  
28



1 capabilities to decode audio and video media. Examples of Sony's promotional materials appear  
2 on the company's website. Sony encourages its customers to purchase its products for no other  
3 purpose than for those customers to use the products to decode and present encoded media.  
4 Because Sony's products include an infringing architecture used to decode MPEG or other  
5 encoded video data, the products have no substantial non-infringing uses.  
6

7 32. Sony has had notice of the '087 patent and its infringement of the '087 patent  
8 since at least April 16, 2015.  
9

10 33. Sony continues to infringe one or more claims of the '087 patent, despite being  
11 aware of its infringement. Sony's infringement has been, and continues to be, willful and  
12 deliberate, and has caused substantial damage to Broadcom.  
13

14 **COUNT 2**

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

16 34. Sony infringes at least claim 3 of the '387 patent under at least 35 U.S.C. §271(a)  
17 and (b). Sony makes, uses, sells, offers to sell, or imports into the United States products, such  
18 as its PlayStation 4, that meet each and every limitation of claim 3.  
19

20 35. Claim 3 of the '387 patent is directed to a binarization system comprising: (1)  
21 means for determining if a code symbol index value is less than a threshold value; (2) means for  
22 constructing a codeword using a unary binarization if said code symbol index value is less than  
23 said threshold value; and (3) means for constructing a codeword using a exp-Golomb binarization  
24 if said code symbol index value is not less than said threshold value.  
25

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

1 recommendations provided by the International Telecommunications Union’s Standardization  
2 Sector (ITU-T). The PlayStation 4, for example, supports H.264, which is provided by the ITU-  
3 T. The encoding methodology claimed by the ’387 patent allows Sony’s products to reduce file  
4 size or bit rate required by the system. Other Sony products, such as PlayStation 3 and the Alpha  
5 6000 camera, also infringe at least one claim of the ’387 patent.  
6

7           37. The PlayStation 4 includes hardware and software for encoding video using  
8 context-adaptive binary arithmetic coding (“CABAC”). CABAC is incorporated into the  
9 standards adopted by MPEG and ITU-T. For example, consistent with certain profiles of the  
10 H.264 standard, PlayStation 4’s hardware and software include a binarization system that  
11 determines a value for the content that is to be encoded. In the case of CABAC encoded H.264  
12 data, the system utilizes unary exp-Golomb binarization as part of the process to encode the  
13 content.  
14

15           38. Sony also induces infringement by its customers of at least claim 3 of the ’387  
16 patent. Sony promotes and advertises the use of its products, especially their capabilities to  
17 encode H.264 video data. Examples of Sony’s promotional materials appear on the company’s  
18 website. Sony encourages its customers to purchase its products for no other purpose than for  
19 those customers to use the products for encoding and decoding video data.  
20

21           39. Sony has had notice of the ’387 patent and of its infringement of the ’387 patent  
22 since at least April 16, 2015.  
23

24           40. Sony continues to infringe one or more claims of the ’387 patent, despite being  
25 aware of its infringement. Sony’s infringement has been, and continues to be, willful and  
26 deliberate, and has caused substantial damage to Broadcom.  
27  
28

**COUNT 3**

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

1  
2  
3 41. Sony infringes at least claims 11 and 21 of the '663 patent under at least 35 U.S.C.  
4 §271(a) and (b). Sony makes, uses, sells, offers to sell, or imports into the United States  
5 products, such as its PlayStation 4, that meet each and every limitation of claims 11 and 21.  
6

7 42. Claim 11 of the '663 patent is directed to a system comprising: (1) a decoder  
8 configured to generate a codeword; and (2) a circuit configured to (a) set an index value to a  
9 threshold in response to a first portion of the codeword having a first pattern, (b) add an offset to  
10 the index value based on a second pattern in a second portion of the codeword following the first  
11 portion in response to the first portion having a first pattern, and (c) add a value to the index  
12 value based on a third pattern in a third portion of the codeword following the second portion in  
13 response to the first portion having the first pattern.  
14

15 43. Claim 21 is of the '663 patent is directed to a system comprising: (1) a circuit  
16 configured to (a) generate a first pattern in a first portion of a codeword in response to an index  
17 value being at least as great as a certain threshold, (b) generate a second pattern in a second  
18 portion of the codeword following the first portion representing an offset of the index value above  
19 the threshold, and (c) generate a third pattern in a third portion of the codeword following the  
20 second portion representing a value of the index value above the offset; and (2) an encoder  
21 configured to encode the codeword.  
22

23  
24 44. Sony's products, such as its PlayStation 4, are capable of encoding and decoding  
25 video information in accordance with the MPEG-4 standard, set forth by the Motion Pictures  
26 Expert Group. Certain portions of the MPEG standards are also adopted by the standards and  
27 recommendations provided by the International Telecommunications Union's Standardization  
28

1 Sector (ITU-T). The PlayStation 4, for example, supports H.264, which is provided by the ITU-  
2 T. The encoding and decoding methodology claimed by the '663 patent allows Sony's products  
3 to reduce file size or bit rate required by the system. Other Sony products, such as the Alpha  
4 6000 camera, PlayStation 3, Blu-Ray players, and digital TVs, also infringe at least one claim of  
5 the '663 patent.  
6

7 45. The PlayStation 4 includes hardware and software for encoding video data using  
8 CABAC. CABAC is incorporated into the standards adopted by MPEG and ITU-T. For  
9 example, consistent with certain profiles of the H.264 standard, PlayStation 4's hardware and  
10 software infringes claim 21 of the '663 patent because it includes a binarization system that  
11 generates a codeword for the content that is to be encoded. The system utilizes unary exp-  
12 Golomb binarization as part of the process to encode the content. The PlayStation 4 also  
13 includes an encoder that encodes the content.  
14  
15

16 46. PlayStation 4 includes hardware and software for decoding video data encoded  
17 using CABAC. PlayStation 4 infringes claim 11 of the '663 patent because it includes a system  
18 comprising a decoder configured to generate a codeword and a circuit that is able to read the  
19 various patterns in the encoded data to generate a value associated with the original content as  
20 part of the process to decode the encoded data.  
21

22 47. Sony also induces the infringement by its customers of claims 11 and 21 of the '663  
23 patent. Sony promotes and advertises the use of its products, especially their capabilities to  
24 encode and decode video data. Examples of Sony's promotional materials appear on the  
25 company's website. Sony encourages its customers to purchase its products for no other purpose  
26 than for those customers to use the products to encode and decode video data.  
27  
28

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

3  
4 49. Sony continues to infringe one or more claims of the '663 patent, despite being  
5 aware of its infringement. Sony's infringement has been, and continues to be, willful and  
6 deliberate, and has caused substantial damage to Broadcom.

7 **COUNT 4**

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

9 50. Sony infringes at least claim 23 of the '636 patent under at least 35 U.S.C. §271(a)  
10 and (b). Sony makes, uses, sells, offers to sell, or imports into the United States products, such  
11 as its Blu-Ray disc players, that meet each and every limitation of at least claim 23.  
12

13 51. Claim 23 of the '636 patent is directed to an apparatus for synthesizing an auditory  
14 scene, comprising: (1) a time-frequency transformer configured to convert an input audio signal  
15 from a time domain into one or more frequency bands in a frequency domain, wherein each band  
16 comprises a plurality of sub-bands; (2) an auditory scene synthesizer configured to apply an  
17 auditory scene parameter to each band to generate two or more output audio signals, wherein the  
18 auditory scene parameter is modified for each different sub-band in the band based on a  
19 coherence value, wherein the coherence value is related to perceived width of a synthesized audio  
20 source corresponding to the two or more output audio signals; and (3) one or more inverse time-  
21 frequency transformers configured to convert the two or more output audio signals from the  
22 frequency domain into the time domain.  
23  
24

25 52. Sony's products, such as its BDP-S7200 Blu-Ray disc player, are capable of  
26 decoding audio data to effectively synthesize an audio scene. Sony's Blu-Ray disc players are  
27 capable of decoding MPEG-4 part 3 encoded audio that uses parametric stereo encoding to  
28

1 synthesize audio scenes that allow the listener to perceive the spatial location of the various audio  
2 sources within the scene. The encoding mechanism utilizes coherence and associated  
3 parameters to encode the audio scene. Decoders are then able to decode and process this  
4 information to synthesize the scene. The MPEG-4 part 3 compliant decoders, such as those used  
5 in Sony's Blu-Ray disc players, include hardware and/or software that convert incoming audio  
6 data from the time domain into the frequency domain and apply the parameters to generate audio  
7 signals that recreate the audio sources within a scene. The MPEG-4 part 3 compliant products  
8 also include hardware and/or software to convert the frequency domain signals back into the time  
9 domain. The resulting audio output is able to recreate, for the listener, the original audio scene  
10 as was encoded.  
11

12  
13 53. On information and belief, other Sony products similarly infringe one or more  
14 claims of the '636 patent. Such products include Sony's digital TVs, PlayStation products, audio  
15 receivers, and Walkman products.  
16

17 54. Sony also induces infringement by its customers of at least claim 23 of the '636  
18 patent. Sony promotes and advertises the use of its products, especially their capabilities to  
19 decode audio and video media. Examples of Sony's promotional materials appear on the  
20 company's website. Sony encourages its customers to purchase its products for no other purpose  
21 than for those customers to use the products to decode and present the encoded media.  
22

23 55. Sony has had notice of the '636 patent and of its infringement of the '636 patent  
24 since at least April 16, 2015.  
25

26 56. Sony continues to infringe one or more claims of the '636 patent, despite being  
27 aware of its infringement. Sony's infringement has been, and continues to be, willful and  
28

1 deliberate, has caused substantial damage to Broadcom.

2 **COUNT 5**

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

4 57. Sony infringes at least claim 36 of the '805 patent under at least 35 U.S.C. §271(a)  
5 and (b). Sony makes, uses, sells, offers to sell, or imports into the United States products, such  
6 as its Blu-Ray disc players, that meet each and every limitation of at least claim 36.  
7

8 58. Claim 36 of the '805 patent is directed to an apparatus for synthesizing an  
9 auditory scene, comprising: (1) a configuration of at least one time domain to frequency domain  
10 (TD-FD) converter and a plurality of filters, the configuration adapted to generate two or more  
11 processed FD input signals and two or more diffuse FD signals from at least one TD input  
12 channel; (2) two or more combiners adapted to combine the two or more diffuse FD signals with  
13 the two or more processed FD input signals to generate a plurality of synthesized FD signals; and  
14 (3) two or more frequency domain to time domain (FD-TD) converters adapted to convert the  
15 synthesized FD signals into a plurality of TD output channels for the auditory scene, wherein: (a)  
16 the configuration comprises: (i) a first TD-FD converter adapted to convert the at least one TD  
17 input channel into a plurality of FD input signals; (ii) a plurality of delay nodes adapted to delay  
18 the FD input signals to generate a plurality of delayed FD signals; and (iii) a plurality of  
19 multipliers adapted to scale the delayed FD signals to generate a plurality of scaled, delayed FD  
20 signals; (b) the delay nodes are adapted to delay the FD input signals based on inter-channel time  
21 difference (ICTD) data; and (c) the multipliers are adapted to scale the delayed FD signals based  
22 on inter-channel level difference (ICLD) and inter-channel correlation (ICC) data.  
23  
24  
25

26 59. Sony's products, such as its BDP-S7200 Blu-Ray disc player, are capable of  
27 decoding audio data to effectively synthesize an audio scene. Sony's Blu-Ray disc players are  
28

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

15  
16  
17  
18 60. On information and belief, other Sony products similarly infringe one or more  
19 claims of the '805 patent. Such products include Sony's digital TVs, audio receivers, PlayStation  
20 products, and Walkman products.

21  
22 61. Sony also induces the infringement by its customers of at least claim 36 of the '805  
23 patent. Sony promotes and advertises the use of its products, especially their capabilities to  
24 decode audio and video media. Examples of Sony's promotional materials appear on the  
25 company's website. Sony encourages its customers to purchase its products for no other purpose  
26 than for those customers to use the products to decode and present the encoded media.  
27  
28





1 Sector (ITU-T). The PlayStation 4, for example, supports H.264, which is provided by the ITU-  
2 T. The decoding methodology claimed by the '151 patent allows Sony's products to accelerate  
3 arithmetic decoding of encoded data. Other Sony products, such as its PlayStation 3, digital TVs  
4 and Blu-Ray players, also infringe at least one claim of the '151 patent.  
5

6 67. For example, the PlayStation 4 includes hardware and software for decoding  
7 H.264 video encoded with CABAC. CABAC is incorporated into the standards adopted by  
8 MPEG and ITU-T. The PlayStation 4 includes a memory for receiving CABAC encoded data,  
9 and a decoder for decoding the received data. The decoder continuously decodes the CABAC  
10 encoded data bit-by-bit and generates bins of data from the CABAC encoded data at a rate  
11 consistent with the rate at which the CABAC encoded data is received. The PlayStation 4's  
12 decoder further includes hardware and software to decode the bins to recreate the original video  
13 content at a rate consistent with the display rate for the encoded video data.  
14

15  
16 68. Sony also induces infringement by its customers of at least claim 6 of the '151  
17 patent. Sony promotes and advertises the use of its products, especially their capabilities to  
18 decode video data. Examples of Sony's promotional materials appear on the company's website.  
19 Sony encourages its customers to purchase its products for no other purpose than for those  
20 customers to use the products for encoding and decoding video data.  
21

22 69. Sony has notice of the '151 patent and of its infringement at least through the filing  
23 and service of the Complaint.  
24

25 70. Sony's infringement has caused and will continue to cause substantial damage to  
26 Broadcom.  
27  
28

COUNT 7

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

1  
2  
3 71. Sony infringes at least claim 6 of the '643 patent under at least 35 U.S.C. §271(a),  
4 (b), and (c). Sony makes, uses, sells, offers to sell, or imports into the United States products,  
5 such as its PlayStation 4, that meet each and every limitation of at least claim 6.  
6

7 72. Claim 6 of the '643 patent is directed to a radio frequency (RF) transmitter  
8 comprising: (1) a baseband processing module operably coupled to convert outbound data into an  
9 outbound symbol stream; and (2) a transmitter section operably coupled to convert the outbound  
10 symbol stream into outbound RF signals, wherein the baseband processing module is operably  
11 coupled to: (a) determine channel bandwidth of a channel that supports the wide bandwidth  
12 signals in the network; (b) determine overlap of legacy channel bandwidth with the channel  
13 bandwidth of the channel; and (c) provide a legacy readable preamble portion as part of a frame  
14 transmitted within the channel wherein a legacy device is operable to interpret the legacy  
15 readable preamble portion but not operable to interpret remaining portions of the frame.  
16  
17

18 73. Sony's products, such as its PlayStation 4, include a radio frequency transmitter  
19 for communicating in a wireless local area network ("WLAN"). The PlayStation 4 complies  
20 with certain standards for implementing and communicating within a WLAN, such as those  
21 adopted by the Institute of Electrical and Electronics Engineers ("IEEE") in its 802.11n and  
22 802.11ac standards. The PlayStation 4's transmitter includes hardware and software that  
23 provides for the conversion of outbound data and transmission in 40 MHz high throughput (HT)  
24 format as set forth in 802.11n or very high throughput (VHT) format as set forth in 802.11ac.  
25 Further, in accordance with the standards, legacy transmissions may occur in 20 MHz  
26 subchannels of a wideband 40 MHz channel. Additionally, the transmitter includes hardware  
27  
28

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

3  
4 74. Other Sony products similarly infringe one or more claims of the '643 patent.  
5 Such other products include Sony's digital TV products, cameras, camcorders, audio receivers,  
6 Blu-Ray and other media players, and other PlayStation products.

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

14  
15  
16 76. Sony has notice of the '643 patent and of its infringement at least through the  
17 filing and service of the Complaint.

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

20  
21 **COUNT 8**

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

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

26  
27 79. Claim 21 is directed to a system for communicating information in a  
28 communication system, comprising: (1) a transmitter that is operable to concurrently transmit, to

1 a single receiving device, data via a plurality of RF channels utilizing a plurality of transmitting  
2 antennas; (2) said transmitter is operable to receive feedback information related to said plurality  
3 of RF channels; (3) said transmitter is operable to assign bits for transmission via said plurality of  
4 transmitting antennas based on said feedback information; and (4) said transmitter is operable to  
5 transmit at least a portion of subsequent data having at least a first coding rate based on said  
6 assignment of bits via said at least one of said plurality of RF channels.  
7

8           80. Sony's products, such as its PlayStation 4, include a radio frequency transmitter  
9 for communicating in a WLAN. The PlayStation 4 complies with certain standards for  
10 implementing and communicating within a WLAN, such as those adopted by the IEEE 802.11n  
11 and 802.11ac standards. The PlayStation 4's transmitter includes at least two antennas and in  
12 compliance with the standards, supports the high throughput PHY specification as set forth in  
13 802.11n and very high throughput PHY specification as set forth in 802.11ac. Further, in  
14 accordance with the standards, the transmitter is capable of receiving beamforming feedback. On  
15 information and belief, such feedback is used to assign bits for transmission and the device  
16 transmits at least a portion of subsequent data based on the assignment of bits. The high  
17 throughput and very high throughput data subcarriers are modulated using binary phase shift  
18 keying, quadrature phase shift keying, 16-quadrature amplitude modulation ("QAM"), 64-  
19 QAM, and 256-QAM. Additionally, forward error correction coding is used with certain coding  
20 rates.  
21

22           81. Other Sony products similarly infringe one or more claims of the '955 patent.  
23 Such other products include Sony's digital TV products, cameras, camcorders, audio receivers,  
24 Blu-Ray and other media players, and PlayStation 3 and other PlayStation products.  
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1 82. Sony also induces and contributes to the infringement by its customers of at least  
2 claim 21 of the '955 patent. Sony promotes and advertises the use of its products, especially their  
3 capabilities to communicate wirelessly in local networks. Examples of Sony's promotional  
4 materials appear on the company's website. Sony encourages its customers to purchase its WiFi  
5 enabled products for no other purpose than for those customers to use the wireless transmitter to  
6 communicate with other devices in the network. Accordingly, the transmitters within the  
7 products have no substantial non-infringing uses.  
8

9  
10 83. Sony has notice of the '955 patent and of its infringement at least through the  
11 filing and service of the Complaint.

12 84. Sony's infringement has caused and will continue to cause substantial damage to  
13 Broadcom.  
14

15 **COUNT 9**

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

17 85. Sony infringes at least claim 1 of the '294 patent under at least 35 U.S.C. §271(a)  
18 and (b). Sony makes, uses, sells, offers to sell, or imports into the United States products, such  
19 as its PlayStation 4, that meet each and every limitation of at least claim 1.  
20

21 86. Claim 1 of the '294 patent is directed to a system for decoding video data encoded  
22 with a particular standard, comprising: (1) a video decoder for decoding the video data encoded  
23 with the particular standard, wherein the video decoder comprises a master processor; (2)  
24 instruction memory for storing: (a) a first set of instructions for decoding encoded video data  
25 according to a first encoding standard; and (b) a second set of instructions for decoding encoded  
26 video data according to a second encoding standard; (3) a host processor for providing an  
27 indication to the video decoder indicating the particular encoding standard, wherein the video  
28

1 decoder, comprising the master processor, for decoding the video data encoded with the  
2 particular standard is discrete from the host processor; and (4) wherein the video decoder  
3 executes the first set of instructions if the indication indicates that the particular encoding  
4 standard is the first encoding standard and executes the second set of instructions if the  
5 indication indicates that the particular encoding standard is the second encoding standard.  
6

7 87. Sony's products, such as its PlayStation 4, includes a multi standard video  
8 decoder for decoding encoded video. The PlayStation 4 includes memory that stores  
9 instructions for decoding video in accordance with a number of different standards, such as  
10 standards adopted by MPEG and ITU-T, among others. Further, the video decoder within the  
11 PlayStation 4 includes the AMD Radeon graphics processing unit and the AMD Jaguar central  
12 processing unit. The system processor is capable of identifying the standard under which the  
13 video data was encoded and the graphics processor is capable of decoding the encoded data using  
14 instructions stored in memory for decoding data under that particular standard.  
15  
16

17 88. On information and belief, other Sony products similarly infringe one or more  
18 claims of the '294 patent. Such other products include Sony's PlayStation 3 and digital TVs.  
19

20 89. Sony also induces infringement by its customers of at least claim 1 of the '151  
21 patent. Sony promotes and advertises the use of its products, especially their capabilities to  
22 decode video data. Examples of Sony's promotional materials appear on the company's website.  
23 Sony encourages its customers to purchase its products for no other purpose than for those  
24 customers to use the products for decoding video data.  
25

26 90. Sony has notice of the '294 patent and of its infringement at least through the  
27 filing and service of the Complaint.  
28

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

3  
4                                    COUNT 10

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

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

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

19           94.       Sony's PlayStation 4 and its DualShock 4 controller include, among other things,  
20 buttons and joysticks that control player actions in video games, an interface that allows the  
21 wireless controller to communicate with the base system, and a light bar having different colored  
22 lights that are capable of changing colors to provide the user the ability to identify the particular  
23 player that controller is controlling. For example, in multiplayer games, the DualShock 4  
24 controller uses a blue, red, green, or pink color that corresponds with the color of the player being  
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26  
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28



1 controlled by that controller in the video game.

2 95. Sony also induces infringement by its customers of at least claim 12 of the '332  
3 patent. Sony promotes and advertises the use of its products, especially their capabilities to use  
4 the light bar on the controller in conjunction with video games. Examples of Sony's promotional  
5 materials appear on the company's website. Sony encourages its customers to purchase its  
6 products for no other purpose than for those customers to use the products to play video games.  
7 Further, the light bars are used and on by default.  
8

9  
10 96. Sony has had knowledge of the '332 patent and of its infringement of the '332  
11 patent since at least the filing and service of this Complaint.

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

14 **PRAYER FOR RELIEF**

15  
16 Broadcom requests that judgment be entered in its favor and against Sony as follows:

- 17 a. Entering judgment declaring that Sony has infringed one or more claims of the  
18 Patents-in-Suit in violation of 35 U.S.C. §271;
- 19 b. Declaring that Sony's infringement of the '087, '387, '663, and '636 patents is  
20 willful and deliberate pursuant to 35 U.S.C. §284;
- 21 c. Enjoining Sony from further infringing the '151, '294, '332, and '955 patents;
- 22 d. Ordering that Broadcom be awarded damages in an amount no less than a  
23 reasonable royalty for each asserted patent arising out of Sony's infringement of  
24 the Patents-in-Suit, together with any other monetary amounts recoverable by  
25 Broadcom, such as treble damages;
- 26 e. Declaring this an exceptional case under 35 U.S.C. §285 and awarding attorneys'  
27 fees; and
- 28 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.

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1 Dated: June 6, 2016

Respectfully submitted by:

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**BROADCOM CORPORATION AND**

20 **AVAGO TECHNOLOGIES GENERAL IP**

21 **(SINGAPORE) PTE. LTD.**

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