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

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

Plaintiffs,

v.

SONY CORPORATION,  
SONY CORPORATION OF AMERICA,  
SONY INTERACTIVE ENTERTAINMENT AMERICA  
LLC;  
SONY ELECTRONICS, INC.;  
SONY CREATIVE SOFTWARE, INC.; AND  
SONY PICTURES HOME ENTERTAINMENT INC.

Defendants.

Case No. 8:16-cv-1052

**FIRST AMENDED COMPLAINT  
FOR PATENT INFRINGEMENT**

**DEMAND FOR JURY TRIAL**

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

6 **PARTIES**

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

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

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

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

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

25 6. Defendant Sony Electronics, Inc. is a Delaware corporation with a  
26 principal place of business at 16530 Via Esprillo, San Diego, California 92127. Sony  
27 Electronics Inc. may be served through its registered agent Corporation Service  
28

1 Company, 80 State Street, Albany, New York 12207-2543.

2 7. Sony Creative Software, Inc. is a Delaware corporation with a  
3 principal place of business at 8215 Greenway Blvd., Suite 400, Middleton, WI  
4 53562. Sony Creative Software Inc. may be served through its registered agent  
5 Corporation Service Company, 2711 Centerville Road, Suite 400, Wilmington,  
6 Delaware 19808.

7 8. Sony Pictures Home Entertainment Inc. is a Delaware corporation  
8 with a principal place of business at 10202 W. Washington Blvd., SPP 119, Culver  
9 City, California. Sony Pictures Home Entertainment Inc. may be served through  
10 its registered agent National Registered Agents, Inc., 160 Greentree Dr., Suite 101,  
11 Dover, Delaware 19904.

## 12 JURISDICTION AND VENUE

13 9. Broadcom brings this civil action for patent infringement under the  
14 Patent Laws of the United States, 35 U.S.C. § 1 *et. seq.*, including 35 U.S.C. §§ 271,  
15 281-285. This Court has subject matter jurisdiction over this action under 28  
16 U.S.C. §§ 1331 and 1338.

17 10. Upon information and belief, Sony Corporation, Sony Corporation of  
18 America, Sony Interactive Entertainment America LLC, Sony Electronics, Inc.,  
19 Sony Creative Software, Inc. and Sony Pictures Home Entertainment Inc.  
20 (collectively “Sony”) transact and conduct business in this District and the State  
21 of California, and are subject to the personal jurisdiction of this Court. For  
22 example, Sony Electronics, Inc. is headquartered in San Diego. Sony Corporation  
23 of America is registered to do business in the State of California, and maintains a  
24 registered agent for service of process in Sacramento. Sony Interactive  
25 Entertainment America LLC’s worldwide headquarters is located in San Mateo.  
26 Sony Corporation also conducts a substantial amount of business in the State of  
27 California, directly or through its wholly owned subsidiaries. Sony Creative  
28

1 Software maintains offices in the State of California and at least controls and  
2 operates its website from its California offices. Sony Pictures Home  
3 Entertainment, Inc. maintains its principal place of business in Culver City. On  
4 information and belief, Sony maintains a number of offices in this District, and  
5 employs residents of this district.

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

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

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

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

### 20 **THE PATENTS-IN-SUIT**

21 15. On February 9, 1999, the United States Patent and Trademark Office  
22 ("USPTO") duly and legally issued, after a full and fair examination, U.S. Pat. No.  
23 5,870,087 ("the '087 patent"), titled "MPEG Decoder System and Method  
24 Having a Unified Memory for Transport Decode and System Controller  
25 Function," to inventor Kwok Kit Chau. A true and correct copy of the '087 patent  
26 is attached as Exhibit A to this Complaint.

27 16. On June 1, 2004, the USPTO duly and legally issued, after a full and  
28

1 fair examination, U.S. Pat. No. 6,744,387 (“the ’387 patent”), titled “Method and  
2 System for Symbol Binarization,” to inventor Lowell Winger. A true and correct  
3 copy of the ’387 patent is attached as Exhibit B to this Complaint.

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

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

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

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

23 21. On July 15, 2008, the USPTO duly and legally issued, after a full and  
24 fair examination, U.S. Pat. No. 7,400,643 (“the ’643 patent”), titled  
25 “Transmission of Wide Bandwidth Signals in a Network Having Legacy Devices,”  
26 to inventors Christopher J. Hansen, Jason A. Trachewsky, and R. Tushar Moorti.  
27 A true and correct copy of the ’643 patent is attached as Exhibit G to this  
28

1 Complaint.

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

8 23. On May 18, 2010, the USPTO duly and legally issued, after a full and  
9 fair examination, U.S. Pat. No. 7,720,294 (“the ’294 patent”), titled “Unified  
10 Decoder Architecture,” to inventors Ravindra Bidnur, Ramada Lakshmikanth Pai,  
11 Bhaskar Sherigar, Aniruddha Sane, Sandeep Bhatia, and Gaurava Agarwal. A true  
12 and correct copy of the ’294 patent is attached as Exhibit I to this Complaint.

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

### 18 **BACKGROUND**

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

26 26. In 2016, Avago Technologies Limited acquired Broadcom  
27 Corporation, consolidating significant technological knowledge and substantial  
28

1 patent portfolios under the umbrella of a new parent entity, Broadcom Limited.  
2 Broadcom Corp. had long been known as an innovator of technologies for wired  
3 and wireless communication, enterprise storage, and industrial facilities.  
4 Broadcom Corp. spent billions of dollars in research and development which lead  
5 to thousands of cutting edge technologies and products. Broadcom Corp.'s  
6 significant investment in research and development also lead to its substantial  
7 patent portfolio.

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

12 28. Sony's most recent portfolio license with LSI lapsed on March 31,  
13 2014. Despite continuing to use the various technological advancements provided  
14 by the LSI patent portfolio, Sony has failed to compensate Broadcom for the use of  
15 these technologies and those of Broadcom Corporation. Since April, 2015,  
16 Broadcom has made a number of attempts to resolve Sony's continued  
17 infringement amicably and has engaged in extensive licensing negotiations with  
18 Sony. But, Broadcom's efforts were unsuccessful. After numerous meetings and  
19 negotiation, Broadcom provided Sony with a written offer to license portions of its  
20 patent portfolio but received no counteroffer. Accordingly, Broadcom has now  
21 filed this lawsuit.

## 22 COUNT 1

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

24 29. Sony infringes at least claim 1 of the '087 patent under 35 U.S.C.  
25 §271(a), (b), and (c). Sony makes, uses, sells, offers to sell, or imports into the  
26 United States products, such as the PlayStation 4, that meet each and every  
27 limitation of claim 1.



1           30. Claim 1 of the '087 patent is directed to an MPEG decoder system  
2 which includes a single memory for use by transport, decode and system controller  
3 functions, comprising: (1) a channel receiver for receiving and [sic] MPEG encoded  
4 stream; (2) transport logic coupled to the channel receiver which demultiplexes  
5 one or more multimedia data streams from the encoded stream; (3) a system  
6 controller coupled to the transport logic which controls operations within the  
7 MPEG decoder system; (4) an MPEG decoder coupled to receive one or more  
8 multimedia data streams output from the transport logic, wherein the MPEG  
9 decoder operates to perform MPEG decoding on the multimedia data streams; and  
10 (5) a memory coupled to the MPEG decoder, wherein the memory is used by the  
11 MPEG decoder during MPEG decoding operations, wherein the memory stores  
12 code and data useable by the system controller which enable the system controller  
13 to perform control functions within the MPEG decoder system, wherein the  
14 memory is used by the transport logic for demultiplexing operations; (6) wherein  
15 the MPEG decoder is operable to access the memory during MPEG decoding  
16 operations; (7) wherein the transport logic is operable to access the memory to  
17 store and retrieve data during demultiplexing operations; and (8) wherein the  
18 system controller is operable to access the memory to retrieve code and data during  
19 system control functions.

20           31. Sony's products infringe at least claim 1 of the '087 patent. The  
21 PlayStation 4 includes a system controller and graphics processor that are capable  
22 of decoding video and other data. For example, the PlayStation 4 includes an  
23 AMD Jaguar 8 core CPU and an AMD Radeon Graphics processor. The  
24 PlayStation 4 is further capable of decoding MPEG encoded data. The encoded  
25 data stream typically consists of audio, video, and program and system information  
26 protocol data, which is separated and processed by the system. The system  
27 controller and graphics processor receive encoded video data, for example, from  
28



1 discs that are inserted into the PlayStation 4. The PlayStation 4 includes memory  
2 that is used by the system to store and separate the MPEG or other encoded data  
3 from the inserted discs and also to transport the information to the graphics  
4 processor. On information and belief, the memory is also used by the system  
5 controller and graphics processor for decoding and other system level functions  
6 that ultimately lead to presenting the information to the viewer.

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

10 33. Sony also induces and contributes to the infringement by its customers  
11 of at least claim 1 of the '087 patent. Sony promotes and advertises the use of its  
12 products, especially their capabilities to decode audio and video media. Examples  
13 of Sony's promotional materials appear on the company's website. Sony  
14 encourages its customers to purchase its products for no other purpose than for  
15 those customers to use the products to decode and present encoded media.  
16 Because Sony's products include an infringing architecture used to decode MPEG  
17 or other encoded video data, the products have no substantial non-infringing uses.

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

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

## 24 COUNT 2

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

26 36. Sony infringes at least claim 3 of the '387 patent under at least 35  
27 U.S.C. §271(a) and (b). Sony makes, uses, sells, offers to sell, or imports into the  
28

1 United States products, such as its PlayStation 4, that meet each and every  
2 limitation of claim 3.

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

9 38. Sony's products, such as its PlayStation 4, are capable of encoding  
10 video information in accordance with the MPEG-4 standard, set forth by the  
11 Motion Pictures Expert Group. Certain portions of the MPEG standards are also  
12 adopted by the standards and recommendations provided by the International  
13 Telecommunications Union's Standardization Sector (ITU-T). The PlayStation 4,  
14 for example, supports H.264, which is provided by the ITU-T. The encoding  
15 methodology claimed by the '387 patent allows Sony's products to reduce file size  
16 or bit rate required by the system. Other Sony products, such as PlayStation 3,  
17 Alpha 6000 camera, DoStudio software, and streaming services also infringe at  
18 least one claim of the '387 patent.

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

26 40. Sony also induces infringement by its customers of at least claim 3 of  
27 the '387 patent. Sony promotes and advertises the use of its products, especially  
28

1 their capabilities to encode H.264 video data. Examples of Sony's promotional  
2 materials appear on the company's website. Sony encourages its customers to  
3 purchase its products for no other purpose than for those customers to use the  
4 products for encoding and decoding video data.

5 41. Sony has had notice of the '387 patent and of its infringement of the  
6 '387 patent since at least April 16, 2015.

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

### 11 COUNT 3

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

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

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

25 45. Claim 21 of the '663 patent is directed to a system comprising: (1) a  
26 circuit configured to (a) generate a first pattern in a first portion of a codeword in  
27 response to an index value being at least as great as a certain threshold, (b) generate  
28

1 a second pattern in a second portion of the codeword following the first portion  
2 representing an offset of the index value above the threshold, and (c) generate a  
3 third pattern in a third portion of the codeword following the second portion  
4 representing a value of the index value above the offset; and (2) an encoder  
5 configured to encode the codeword.

6 46. Sony's products, such as its PlayStation 4, are capable of encoding and  
7 decoding video information in accordance with the MPEG-4 standard, set forth by  
8 the Motion Pictures Expert Group. Certain portions of the MPEG standards are  
9 also adopted by the standards and recommendations provided by the International  
10 Telecommunications Union's Standardization Sector (ITU-T). The PlayStation 4,  
11 for example, supports H.264, which is provided by the ITU-T. The encoding and  
12 decoding methodology claimed by the '663 patent allows Sony's products to  
13 reduce file size or bit rate required by the system. Other Sony products, such as the  
14 Alpha 6000 camera, PlayStation 3, Blu-Ray players, digital TVs, DoStudio  
15 software, and streaming services also infringe at least one claim of the '663 patent.

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

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

3 49. Sony also induces the infringement by its customers of claims 11 and  
4 21 of the '663 patent. Sony promotes and advertises the use of its products,  
5 especially their capabilities to encode and decode video data. Examples of Sony's  
6 promotional materials appear on the company's website. Sony encourages its  
7 customers to purchase its products for no other purpose than for those customers  
8 to use the products to encode and decode video data.

9 50. Sony has had notice of the '663 patent and of its infringement of the  
10 '663 patent since at least April 16, 2015.

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

15 **COUNT 4**

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

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

21 53. Claim 23 of the '636 patent is directed to an apparatus for synthesizing  
22 an auditory scene, comprising: (1) a time-frequency transformer configured to  
23 convert an input audio signal from a time domain into one or more frequency bands  
24 in a frequency domain, wherein each band comprises a plurality of sub-bands; (2)  
25 an auditory scene synthesizer configured to apply an auditory scene parameter to  
26 each band to generate two or more output audio signals, wherein the auditory scene  
27 parameter is modified for each different sub-band in the band based on a coherence  
28

1 value, wherein the coherence value is related to perceived width of a synthesized  
2 audio source corresponding to the two or more output audio signals; and (3) one or  
3 more inverse time-frequency transformers configured to convert the two or more  
4 output audio signals from the frequency domain into the time domain.

5 54. Sony's products, such as its BDP-S7200 Blu-Ray disc player, are  
6 capable of decoding audio data to effectively synthesize an audio scene. Sony's Blu-  
7 Ray disc players are capable of decoding MPEG-4 part 3 encoded audio that uses  
8 parametric stereo encoding to synthesize audio scenes that allow the listener to  
9 perceive the spatial location of the various audio sources within the scene. The  
10 encoding mechanism utilizes coherence and associated parameters to encode the  
11 audio scene. Decoders are then able to decode and process this information to  
12 synthesize the scene. The MPEG-4 part 3 compliant decoders, such as those used  
13 in Sony's Blu-Ray disc players, include hardware and/or software that convert  
14 incoming audio data from the time domain into the frequency domain and apply the  
15 parameters to generate audio signals that recreate the audio sources within a scene.  
16 The MPEG-4 part 3 compliant products also include hardware and/or software to  
17 covert the frequency domain signals back into the time domain. The resulting  
18 audio output is able to recreate, for the listener, the original audio scene as was  
19 encoded.

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

23 56. Sony also induces infringement by its customers of at least claim 23 of  
24 the '636 patent. Sony promotes and advertises the use of its products, especially  
25 their capabilities to decode audio and video media. Examples of Sony's  
26 promotional materials appear on the company's website. Sony encourages its  
27 customers to purchase its products for no other purpose than for those customers  
28

1 to use the products to decode and present the encoded media.

2 57. Sony has had notice of the '636 patent and of its infringement of the  
3 '636 patent since at least April 16, 2015.

4 58. Sony continues to infringe one or more claims of the '636 patent,  
5 despite being aware of its infringement. Sony's infringement has been, and  
6 continues to be, willful and deliberate, has caused substantial damage to Broadcom.

7 **COUNT 5**

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

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

13 60. Claim 36 of the '805 patent is directed to an apparatus for synthesizing  
14 an auditory scene, comprising: (1) a configuration of at least one time domain to  
15 frequency domain (TD-FD) converter and a plurality of filters, the configuration  
16 adapted to generate two or more processed FD input signals and two or more  
17 diffuse FD signals from at least one TD input channel; (2) two or more combiners  
18 adapted to combine the two or more diffuse FD signals with the two or more  
19 processed FD input signals to generate a plurality of synthesized FD signals; and  
20 (3) two or more frequency domain to time domain (FD-TD) converters adapted to  
21 convert the synthesized FD signals into a plurality of TD output channels for the  
22 auditory scene, wherein: (a) the configuration comprises: (i) a first TD-FD  
23 converter adapted to convert the at least one TD input channel into a plurality of  
24 FD input signals; (ii) a plurality of delay nodes adapted to delay the FD input  
25 signals to generate a plurality of delayed FD signals; and (iii) a plurality of  
26 multipliers adapted to scale the delayed FD signals to generate a plurality of scaled,  
27 delayed FD signals; (b) the delay nodes are adapted to delay the FD input signals  
28



1 based on inter-channel time difference (ICTD) data; and (c) the multipliers are  
2 adapted to scale the delayed FD signals based on inter-channel level difference  
3 (ICLD) and inter-channel correlation (ICC) data.

4 61. Sony's products, such as its BDP-S7200 Blu-Ray disc player, are  
5 capable of decoding audio data to effectively synthesize an audio scene. Sony's Blu-  
6 Ray disc players are capable of decoding MPEG-4 part 3 encoded audio that uses  
7 parametric stereo encoding to synthesize audio scenes that allow the listener to  
8 perceive the spatial location of the various audio sources within the scene. This  
9 encoding also accounts for the fact that audio signals generally reach a listener's  
10 ears at different times with different audio levels. The encoding and decoding  
11 mechanisms utilize the difference in level, time, and coherence between various  
12 channels of the audio data to synthesize the audio scene. The MPEG-4 part 3  
13 compliant decoders, such as those included in Sony's Blu-Ray disc players, include  
14 hardware and/or software that convert and filter incoming audio data from the time  
15 domain into the frequency domain. Additionally, the products include hardware  
16 and/or software to process and combine the frequency domain signals, including  
17 delaying and scaling certain signals based on the level, time, and coherence  
18 differences to allow the products to ultimately decode the encoded audio scene.  
19 The MPEG-4 part 3 compliant products also include hardware and/or software to  
20 convert the frequency domain signals back into the time domain. The resulting  
21 audio output is able to recreate, for the listener, the encoded audio scene.

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

25 63. Sony also induces the infringement by its customers of at least claim  
26 36 of the '805 patent. Sony promotes and advertises the use of its products,  
27 especially their capabilities to decode audio and video media. Examples of Sony's  
28

1 promotional materials appear on the company's website. Sony encourages its  
 2 customers to purchase its products for no other purpose than for those customers  
 3 to use the products to decode and present the encoded media.

4 64. Sony has notice of the '805 patent and of its infringement of the '805  
 5 patent through at least the filing and service of Plaintiffs' Original Complaint, filed  
 6 June 6, 2016.

7 65. Sony's infringement has caused and continues to cause substantial  
 8 damage to Broadcom.

### 9 COUNT 6

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

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

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

26 68. Sony's products, such as its PlayStation 4, are capable of decoding  
 27 video information in accordance with the MPEG-4 standard, set forth by the  
 28

1 Motion Pictures Expert Group. Certain portions of the MPEG standards are also  
2 adopted by the standards and recommendations provided by the International  
3 Telecommunications Union's Standardization Sector (ITU-T). The PlayStation 4,  
4 for example, supports H.264, which is provided by the ITU-T. The decoding  
5 methodology claimed by the '151 patent allows Sony's products to accelerate  
6 arithmetic decoding of encoded data. Other Sony products, such as its PlayStation  
7 3, digital TVs Blu-Ray players, also infringe at least one claim of the '151 patent.

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

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

23         71. Sony has notice of the '151 patent and of its infringement at least  
24 through the filing and service of Plaintiffs' Original Complaint, filed June 6, 2016.

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

**COUNT 7**

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

73. 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.

74. 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.

75. 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.

1 Additionally, the transmitter includes hardware and software to provide a legacy  
2 readable preamble as part of the information transmitted to allow legacy devices to  
3 interpret the legacy preamble.

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

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

16 78. Sony has notice of the '643 patent and of its infringement at least  
17 through the filing and service of Plaintiffs' Original Complaint, filed June 6, 2016.

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

## 20 COUNT 8

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

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

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

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

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

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

27       84. Sony also induces and contributes to the infringement by its  
28

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

8 85. Sony has notice of the '955 patent and of its infringement at least  
 9 through the filing and service of Plaintiffs' Original Complaint, filed June 6, 2016.

10 86. Sony's infringement has caused and will continue to cause substantial  
 11 damage to Broadcom.

## 12 COUNT 9

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

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

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



1 and (4) wherein the video decoder executes the first set of instructions if the  
2 indication indicates that the particular encoding standard is the first encoding  
3 standard and executes the second set of instructions if the indication indicates that  
4 the particular encoding standard is the second encoding standard.

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

14 90. On information and belief, other Sony products similarly infringe one  
15 or more claims of the '294 patent. Such other products include Sony's PlayStation  
16 3 and digital TVs.

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

23 92. Sony has notice of the '294 patent and of its infringement at least  
24 through the filing and service of Plaintiffs' Original Complaint, filed June 6, 2016.

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

27 **COUNT 10**  
28

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

94. 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.

95. 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.

96. 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.

97. 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

1 website. Sony encourages its customers to purchase its products for no other  
 2 purpose than for those customers to use the products to play video games.  
 3 Further, the light bars are used and on by default.

4 98. Sony has had knowledge of the '332 patent and of its infringement of  
 5 the '332 patent since at least the filing and service of Plaintiffs' Original Complaint,  
 6 filed June 6, 2016.

7 99. Sony's infringement has caused and continues to cause substantial  
 8 damage to Broadcom.

#### 10 **PRAYER FOR RELIEF**

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

- 13
- 14 a. Entering judgment declaring that Sony has infringed one or more
- 15 claims of the Patents-in-Suit in violation of 35 U.S.C. §271;
- 16 b. Declaring that Sony's infringement of the '087, '387, '663, and '636
- 17 patents is willful and deliberate pursuant to 35 U.S.C. §284;
- 18 c. Enjoining Sony from further infringing the '151, '294, '332, and '955
- 19 patents;
- 20 d. Ordering that Broadcom be awarded damages in an amount no less
- 21 than a reasonable royalty for each asserted patent arising out of Sony's
- 22 infringement of the Patents-in-Suit, together with any other monetary
- 23 amounts recoverable by Broadcom, such as treble damages;
- 24 e. Declaring this an exceptional case under 35 U.S.C. §285 and awarding
- 25 attorneys' fees; and
- 26 f. Awarding Broadcom such other costs and further relief as the Court
- 27 deems just and proper.
- 28

**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.

1 Dated: September 6, 2016

Respectfully submitted by:

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