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7 Attorneys for Plaintiffs  
Broadcom Corporation and  
8 Avago Technologies General IP  
(Singapore) Pte. Ltd.

9 UNITED STATES DISTRICT COURT  
10 CENTRAL DISTRICT OF CALIFORNIA  
11

12 BROADCOM CORPORATION AND  
13 AVAGO TECHNOLOGIES  
GENERAL IP (SINGAPORE) PTE.  
14 LTD.,

15 Plaintiffs,

16 v.

17 AMAZON.COM, INC. and AMAZON  
18 WEB SERVICES, INC.

19 Defendants.

No.

**COMPLAINT FOR PATENT  
INFRINGEMENT**

**DEMAND FOR JURY TRIAL**

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

5 **PARTIES**

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

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

13 3. On information and belief, Defendant Amazon.com, Inc.  
14 (“Amazon.com”) is a corporation organized and existing under the laws of the State  
15 of Delaware, with a principal place of business at 410 Terry Avenue North, Seattle,  
16 Washington 98109, and it may be served through its registered agent at Corporation  
17 Service Company, 2711 Centerville Rd. Ste. 400, Wilmington, Delaware 19808.

18 4. On information and belief, Defendant Amazon Web Services, Inc.,  
19 (“AWS”) is a Delaware corporation headquartered at 410 Terry Ave. N., Seattle,  
20 Washington 98109, and it may be served through its registered agent at CSC –  
21 Lawyers Incorporating Service, 2710 Gateway Oaks Drive, Suite 150N,  
22 Sacramento, California 95833. AWS is registered to do business in the state of  
23 California and is a wholly owned subsidiary of Amazon.com.

24 **JURISDICTION AND VENUE**

25 5. Broadcom brings this civil action for patent infringement under the  
26 Patent Laws of the United States, 35 U.S.C. § 1 *et. seq.*, including 35 U.S.C. §§  
27 271, 281-285. This Court has subject matter jurisdiction over this action under 28  
28 U.S.C. §§ 1331 and 1338.



1 Unified Memory for Transport Decode and System Controller Function,” to  
2 inventor Kwok Kit Chau. A true and correct copy of the '087 Patent is attached as  
3 Exhibit A to this complaint.

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

8 12. On March 10, 2015, the USPTO issued a Certificate of Correction for  
9 the '387 Patent. A true and correct copy of the Certificate of Correction for the  
10 '387 Patent is attached as Exhibit C to this complaint.

11 13. On January 3, 2006, the USPTO duly and legally issued, after a full  
12 and fair examination, U.S. Pat. No. 6,982,663 (“the '663 Patent”), titled “Method  
13 and System for Symbol Binarization,” to inventor Lowell Winger. A true and  
14 correct copy of the '663 Patent is attached as Exhibit D to this complaint.

15 14. On February 28, 2006, the USPTO duly and legally issued, after a full  
16 and fair examination, U.S. Pat. No. 7,006,636 (“the '636 Patent”), titled  
17 “Coherence-Based Audio Coding and Synthesis,” to inventors Frank Baumgarte  
18 and Christof Faller. A true and correct copy of the '636 Patent is attached as  
19 Exhibit E to this complaint.

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

25 16. On August 6, 2002, the USPTO duly and legally issued U.S. Patent  
26 No. 6,430,148, titled “Multidirectional Communication Systems,” to Steven  
27 Richard Ring (“the '148 Patent”). A true and correct copy of the '148 Patent is  
28 attached as Exhibit G to this complaint.

1 17. On July 20, 2004, the USPTO duly and legally issued U.S. Patent No.  
2 6,766,389, titled “System On A Chip For Networking,” to Mark D. Hayter, and  
3 Joseph B. Rowlands, James Y. Cho (“the ’389 Patent”). A true and correct copy of  
4 the ’389 Patent is attached as Exhibit H to this complaint.

5 18. On November 13, 2007, the USPTO duly and legally issued U.S.  
6 Patent No. 7,296,295, titled “Media Processing System Supporting Different Media  
7 Formats Via Server-Based Transcoding,” to Marcus Kellerman, Jeyhan Karaoguz,  
8 and James D. Bennett (“the ’295 Patent”). A true and correct copy of the ’295  
9 Patent is attached as Exhibit I to this complaint.

10 19. On October 9, 2012, the USPTO duly and legally issued U.S. Patent  
11 No. 8,284,844, titled “Video decoding system supporting multiple standards” to  
12 Alexander G. MacInnis, Jose R. Alvarez, Sheng Zhong, Xiaodong Xie, and Vivian  
13 Hsiun (“the ’844 Patent”). A true and correct copy of the ’844 Patent is attached as  
14 Exhibit J to this complaint.

15 20. On December 31, 2002 the USPTO duly and legally issued U.S. Patent  
16 No. 6,501,480, titled “Graphics Accelerator,” to Alexander G. MacInnis, Chengfuh  
17 Jeffrey Tang, Xiaodong Xie, James T. Patterson, and Greg A. Kranawetter (“the  
18 ’480 Patent”). On July 13, 2010, a reexamination certificate issued that confirmed  
19 the patentability of certain claims, as amended. A true and correct copy of the ’480  
20 Patent is attached as Exhibit K to this complaint.

21 21. On January 22, 2002, the USPTO duly and legally issued U.S. Patent  
22 No. 6,341,375, titled “Video on Demand DVD System,” to Daniel Watkins  
23 (“the ’375 Patent”). A true and correct copy of the ’375 Patent is attached as  
24 Exhibit L to this complaint.

### 25 **BACKGROUND**

26 22. In 2014, Avago Technologies Limited acquired LSI Corporation,  
27 including its patent portfolio. The patent portfolio covers innovative technologies  
28 developed by LSI as well as cutting-edge technologies invented by its predecessor

1 companies, including Agere Systems, Inc., Lucent Technologies, AT&T  
2 Corporation, and Bell Laboratories. These companies were preeminent in the  
3 semiconductor industry and at the forefront of technological innovations in this and  
4 other areas.

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

14 24. Amazon is aware of Broadcom's patent portfolio, including  
15 specifically at least some of the patents asserted in this Complaint, based on  
16 communications between Amazon and Broadcom, Avago Technologies, and/or LSI  
17 Corporation. Representatives of Broadcom, Avago Technologies, and/or LSI  
18 Corporation repeatedly attempted to engage Amazon in licensing discussions. In a  
19 last attempt to engage in discussions without litigation, Broadcom again contacted  
20 Amazon on or about June 22, 2016 to request a meeting. Amazon did not respond  
21 to Broadcom's inquiry. Left with no other choice, Broadcom brings this action.

22 **COUNT 1**

23 **Infringement of U.S. Patent No. 5,870,087**

24 25. Amazon infringes at least claim 1 of the '087 Patent under 35 U.S.C. §  
25 271 (a) and (b). Amazon makes, uses, sells, offers to sell, or imports into the  
26 United States products, such as the Fire HD 10 tablet, that meet each and every  
27 limitation of claim 1.

28

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

20           27. Amazon's products that are adapted to or are capable of decoding  
21 electronic video files or video data streams infringe at least claim 1 of the '087  
22 Patent. The Amazon Fire HD 10 includes a system controller and a graphics  
23 processor that meet the elements of claim 1. For example, the Fire HD 10 includes  
24 a quad core MediaTek MT8135 system on chip platform which includes a  
25 PowerVR G6200 graphics processing unit. The Amazon Fire HD 10 is further  
26 capable of decoding MPEG encoded data. The Fire HD 10 includes a channel  
27 receiver for receiving an MPEG encoded stream. An encoded data stream typically  
28 consists of audio, video, and program and system information protocol data, which



1 is separated and processed by the system. The Fire HD 10 includes transport logic  
2 that de-multiplexes one or more data streams from the encoded streams. The Fire  
3 HD 10 includes a system controller coupled to the transport logic that controls  
4 operations within the MPEG decoder system. The Fire HD 10 includes an MPEG  
5 decoder coupled to receive one or more multimedia data streams output from the  
6 transport logic, wherein the MPEG decoder performs MPEG decoding on the  
7 multimedia data streams. On information and belief, the Fire HD 10 also includes a  
8 memory coupled to the MPEG decoder, wherein the memory is used by the MPEG  
9 decoder during MPEG decoding operations, wherein the memory stores code and  
10 data useable by the system controller which enables the system controller to  
11 perform control functions within the MPEG decoder system, wherein the memory  
12 is used by the transport logic for de-multiplexing operations. The MPEG decoder  
13 of the Fire HD 10 is operable to access the memory during MPEG decoding  
14 operations, and the transport logic is operable to access the memory to store and  
15 retrieve data during de-multiplexing operations. The Fire HD 10 system controller  
16 is operable to access the memory to retrieve code and data during system control  
17 functions.

18 28. On information and belief, other Amazon products perform MPEG  
19 decoding and similarly infringe one or more claims of the '087 Patent. Such other  
20 products include the Fire HD 8, Fire, Fire HDX 8.9, Fire HD 7, Fire HD 6, Kindle  
21 Fire HD 7, Kindle Fire HD 8.9, Kindle Fire HD7, Kindle Fire tablets, and  
22 Amazon's Fire TV.

23 29. Amazon has had notice of the '087 Patent and its infringement of the  
24 '087 Patent since at least April 30, 2013.

25 30. Amazon also induces infringement by its customers of at least claims 1  
26 and 10 of the '087 Patent. Amazon promotes and advertises the use of its products,  
27 especially their capabilities to decode audio and video media. Examples of  
28 Amazon's promotional materials appear on the company's website. Amazon



1 encourages its customers to purchase and use its products to decode and present  
2 encoded media in a way that infringes the '087 Patent.

3 31. Amazon continues to infringe one or more claims of the '087 Patent,  
4 despite being aware of its infringement. Amazon's infringement has been, and  
5 continues to be, willful and deliberate, and has caused and continues to cause  
6 substantial damage to Broadcom.

7 **COUNT 2**

8 **Infringement of U.S. Patent No. 6,744,387**

9 32. Amazon infringes at least claim 3 of the '387 Patent under at least 35  
10 U.S.C. § 271(a) and (b). Amazon makes, uses, sells, or offers to sell, in the United  
11 States products and services, such as its Amazon Elastic Transcoder, that meet each  
12 and every limitation of claim 3.

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

19 34. Amazon's products, such as its Amazon Web Services and, in  
20 particular, the Amazon Elastic Transcoder, are capable of encoding video  
21 information in accordance with the MPEG-4 standard, set forth by the Motion  
22 Pictures Expert Group. Certain portions of the MPEG standards are also adopted  
23 by the standards and recommendations provided by the International  
24 Telecommunications Union's Standardization Sector (ITU-T). The Amazon Elastic  
25 Transcoder, for example, supports H.264, which is provided by the ITU-T. The  
26 encoding methodology claimed by the '387 Patent allows Amazon's video files, or  
27 those of Amazon's customers, to reduce file size or bit rate. On information and  
28 belief, other Amazon products that support H.264 encoding, also infringe at least

1 one claim of the '387 Patent.

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

10 36. Amazon has had notice of the '387 Patent and of its infringement of  
11 the '387 Patent since at least the filing of this complaint.

12 37. On information and belief, Amazon also induces infringement by its  
13 customers of at least claim 3 of the '387 Patent. Amazon promotes and advertises  
14 the use of its Amazon Elastic Transcoder, especially its capabilities to encode  
15 H.264 video data. Examples of Amazon's promotional materials appear on the  
16 company's website. Amazon encourages its customers to purchase and use its  
17 services for transcoding video data, including CABAC encoding in a way that  
18 infringes the '387 Patent.

19 38. Amazon continues to infringe one or more claims of the '387 Patent,  
20 despite being aware of its infringement. Amazon's ongoing infringement is willful  
21 and deliberate, and has caused and continues to cause substantial damage to  
22 Broadcom.

### 23 **COUNT 3**

#### 24 **Infringement of U.S. Patent No. 6,982,663**

25 39. Amazon infringes at least claims 1 and 11 of the '663 Patent under at  
26 least 35 U.S.C. § 271(a) and (b). Amazon makes, uses, sells, offers to sell, or  
27 imports into the United States products, such as its Fire tablets, that meet each and  
28 every limitation of claims 1 and 11.

1           40. Claim 1 of the '663 Patent is directed to a method of generating an  
2 index value from a codeword for digital video decoding, comprising the steps of:  
3 (A) setting said index value to a threshold in response to a first portion of said  
4 codeword having a first pattern; (B) adding an offset to said index value based on a  
5 second pattern in a second portion of said codeword following said first portion in  
6 response to said first portion having said first pattern; and (C) adding a value to said  
7 index value based on a third pattern in a third portion of said codeword following  
8 said second portion in response to said first portion having said first pattern.

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

17           42. Amazon's products, such as its Fire tablets, are capable of decoding  
18 video information in accordance with the MPEG-4 standard, set forth by the  
19 Motion Pictures Expert Group. Certain portions of the MPEG standards are also  
20 adopted by the standards and recommendations provided by the International  
21 Telecommunications Union's Standardization Sector (ITU-T). The Fire tablets, for  
22 example, support H.264, which is provided by the ITU-T. The decoding  
23 methodology claimed by the '663 Patent allows Amazon's products to accept  
24 encoded files that reduce file size or bit rate required by the system. Other Amazon  
25 products, such as the FireTV, also infringe at least one claim of the '663 Patent.

26           43. Amazon's Fire tablets perform the methods of claim 1 of the '663  
27 Patent. Upon receiving an encoded data stream, the accused Fire tablets generate  
28 an index value from a codeword for digital video encoding by (a) setting the index

1 value to a threshold in response to a first portion of the codeword having a first  
2 pattern, (b) adding an offset to the index value based on a second pattern in a  
3 second portion of the codeword; and (c) adding a value to the index value based on  
4 a third pattern in a third portion of the codeword following the second portion in  
5 response to the first portion having a first pattern.

6 44. Amazon Fire tablets include hardware and software for decoding video  
7 data encoded using CABAC. Amazon's Fire tablets infringe claim 11 of the '663  
8 Patent because they include a system comprising a decoder configured to generate  
9 a codeword and a circuit that is able to read the various patterns in the encoded data  
10 to generate a value associated with the original content as part of the process to  
11 decode the encoded data.

12 45. Amazon has had notice of the '663 Patent and of its infringement of  
13 the '663 Patent since at least July 30, 2015.

14 46. Amazon also induces the infringement by its customers of claims 1  
15 and 11 of the '663 Patent. Amazon promotes and advertises the use of its products,  
16 especially their capabilities to decode video data. Examples of Amazon's  
17 promotional materials appear on the company's website. Amazon encourages its  
18 customers to purchase and use its products and to use the products to encode and  
19 decode video data in a way that infringes the '663 Patent.

20 47. Amazon continues to infringe one or more claims of the '663 Patent,  
21 despite being aware of its infringement. Amazon's infringement has been, and  
22 continues to be, willful and deliberate, and has caused and continues to cause  
23 substantial damage to Broadcom.

#### 24 **COUNT 4**

#### 25 **Infringement of U.S. Patent No. 7,006,636**

26 48. Amazon infringes at least claim 23 of the '636 Patent under at least 35  
27 U.S.C. § 271(a) and (b). Amazon makes, uses, sells, offers to sell, or imports into  
28 the United States products, such as its Fire tablets, that perform each and every step

1 of at least claim 23.

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

13 50. Amazon's products, such as its Fire tablets, are capable of decoding  
14 audio data to effectively synthesize an audio scene. As advertised on Amazon's  
15 website, Amazon's Fire tablets are capable of decoding MPEG-4 part 3 encoded  
16 audio that uses parametric stereo encoding to synthesize audio scenes that allow the  
17 listener to perceive the spatial location of the various audio sources within the  
18 scene. The encoding mechanism utilizes coherence and associated parameters to  
19 encode the audio scene. Decoders are then able to decode and process this  
20 information to synthesize the scene. The MPEG-4 part 3 compliant decoders, such  
21 as those used in Amazon's Fire tablets, include hardware and/or software that  
22 convert incoming audio data from the time domain into the frequency domain and  
23 apply the parameters to generate audio signals that recreate the audio sources within  
24 a scene. The MPEG-4 part 3 compliant products also include hardware and/or  
25 software to convert the frequency domain signals back into the time domain. The  
26 resulting audio output is able to recreate, for the listener, the original audio scene as  
27 was encoded.

28

1 51. On information and belief, other Amazon products that decode MPEG-  
2 4 part 3 encoded audio similarly infringe one or more claims of the '636 Patent.  
3 Such other products include Amazon's Fire TV.

4 52. Amazon has had notice of the '636 Patent and of its infringement of  
5 the '636 Patent since at least July 30, 2015.

6 53. Amazon also induces infringement by its customers of at least claim  
7 23 of the '636 Patent. Amazon promotes and advertises the use of its products,  
8 especially their capabilities to decode audio and video media. Examples of  
9 Amazon's promotional materials appear on the company's website. Amazon  
10 encourages its customers to purchase and use its products to decode and present the  
11 encoded media in a way that infringes the claims of the '636 Patent.

12 54. Amazon continues to infringe one or more claims of the '636 Patent,  
13 despite being aware of its infringement. Amazon's infringement has been, and  
14 continues to be, willful and deliberate, has caused and continues to cause  
15 substantial damage to Broadcom.

16 **COUNT 5**

17 **Infringement of U.S. Patent No. 7,583,805**

18 55. Amazon infringes at least claim 36 of the '805 Patent under at least 35  
19 U.S.C. § 271(a) and (b). Amazon makes, uses, sells, offers to sell, or imports into  
20 the United States products, such as its Fire tablets, that practice each and every  
21 limitation of at least claim 34.

22 56. Claim 36 of the '805 Patent is directed to an apparatus for synthesizing  
23 an auditory scene, comprising: (1) a configuration of at least one time domain to  
24 frequency domain (TD-FD) converter and a plurality of filters, the configuration  
25 adapted to generate two or more processed FD input signals and two or more  
26 diffuse FD signals from at least one TD input channel; (2) two or more combiners  
27 adapted to combine the two or more diffuse FD signals with the two or more  
28 processed FD input signals to generate a plurality of synthesized FD signals; and

1 (3) two or more frequency domain to time domain (FD-TD) converters adapted to  
2 convert the synthesized FD signals into a plurality of TD output channels for the  
3 auditory scene, wherein: (a) the configuration comprises: (i) a first TD-FD  
4 converter adapted to convert the at least one TD input channel into a plurality of FD  
5 input signals; (ii) a plurality of delay nodes adapted to delay the FD input signals to  
6 generate a plurality of delayed FD signals; and (iii) a plurality of multipliers  
7 adapted to scale the delayed FD signals to generate a plurality of scaled, delayed  
8 FD signals; (b) the delay nodes are adapted to delay the FD input signals based on  
9 inter-channel time difference (ICTD) data; and (c) the multipliers are adapted to  
10 scale the delayed FD signals based on inter-channel level difference (ICLD) and  
11 inter-channel correlation (ICC) data.

12 57. Amazon's products, such as its Fire tablets, are capable of decoding  
13 audio data to effectively synthesize an audio scene. Amazon's Fire tablets are  
14 capable of decoding MPEG-4 part 3 encoded audio that uses parametric stereo  
15 encoding to synthesize audio scenes that allow the listener to perceive the spatial  
16 location of the various audio sources within the scene. This encoding also accounts  
17 for the fact that audio signals generally reach a listener's ears at different times with  
18 different audio levels. The encoding and decoding mechanisms utilize the  
19 difference in level, time, and coherence between various channels of the audio data  
20 to synthesize the audio scene. The MPEG-4 part 3 compliant decoders, such as  
21 those included in Fire tablets, include hardware and/or software that convert and  
22 filter incoming audio data from the time domain and the frequency domain. The  
23 devices also include hardware and /or software to process and combine the  
24 frequency domain signals, including delaying and scaling certain signals based on  
25 the level, time, and coherence differences to allow the products to ultimately  
26 decode the encoded audio scene. The MPEG-4 part 3 compliant products also  
27 include hardware and/or software to convert the frequency domain signals back into  
28 the time domain. The resulting audio output is able to recreate, for the listener, the



1 encoded audio scene.

2 58. On information and belief, other Amazon products similarly infringe  
3 one or more claims of the '805 Patent. Such products include Amazon's FireTV  
4 and other products that decode audio data according to MPEG-4 part 3.

5 59. Amazon has notice of the '805 Patent and of its infringement of the  
6 '805 Patent since at least July 30, 2015.

7 60. Amazon also induces the infringement by its customers of at least  
8 claim 36 of the '805 Patent. Amazon promotes and advertises the use of its  
9 products, especially their capabilities to decode audio and video media. Examples  
10 of Amazon's promotional materials appear on the company's website. Amazon  
11 encourages its customers to purchase and use its products to decode and present the  
12 encoded media in a way that infringes the '805 Patent.

13 61. Amazon continues to infringe one or more claims of the '805 Patent,  
14 despite being aware of its infringement. Amazon's infringement has been, and  
15 continues to be, willful and deliberate, and has caused and continues to cause  
16 substantial damage to Broadcom.

17 **COUNT 6**

18 **Infringement of U.S. Patent No. 6,430,148**

19 62. Amazon infringes at least claim 8 of the '148 Patent under at least 35  
20 U.S.C. § 271(a) and (b). Amazon makes, uses, sells, offers to sell, or imports into  
21 the United States products, systems, software, and/or methods, in whole or in part,  
22 such as its Amazon Dash Button, that comply with, are compatible with, and/or  
23 implement any part of any version of the IEEE 802.11 standard, including without  
24 limitations Clause 18 (titled "Orthogonal frequency division multiplexing (OFDM)  
25 PHY specification"), that practice each and every limitation of at least claim 8 of  
26 the '148 Patent.

27 63. Claim 8 of the '148 Patent is directed to an apparatus for use in an  
28 OFDM communication system. The apparatus comprises a first OFDM device for

1 communicating with a second remote OFDM device at a remote station, the first  
2 OFDM device configured to (i) add a synchronisation signal to a plurality of data  
3 signals, (ii) generate a plurality of sub-carrier signals in response to modulating the  
4 synchronisation signal and the data signals, and (iii) generate a plurality of sub-  
5 carrier frequency signals in response to an inverse fast fourier transformation of the  
6 sub-carrier signals for transmission to the remote station.

7 64. Amazon's products, such as its Amazon Fire HD 10 tablet, are  
8 compatible with the IEEE 802.11 Standard. As an 802.11-compatible product, the  
9 accused product is an apparatus for use in an OFDM communication system. Upon  
10 information and belief, the accused product comprises a first OFDM device for  
11 communicating with a second OFDM device at a remote station. Upon information  
12 and belief, the accused product is configured to add a pilot signal to a plurality of  
13 data signals, generate a plurality of sub-carrier signals by modulating the pilot  
14 signals and data signals, and generate a plurality of sub-carrier frequency signals by  
15 performing an inverse fast Fourier transformation on the sub-carrier signals for  
16 transmission to the remote station.

17 65. On information and belief, other Amazon products similarly infringe  
18 one or more claims of the '148 Patent. Such products include Amazon's  
19 Paperwhite E-reader, Dash Button, FireTV, and Echo.

20 66. Amazon has had notice of the '148 Patent and of its infringement of  
21 the '148 Patent since at least July 30, 2015.

22 67. Amazon also induces infringement by its customers of at least claim 8  
23 of the '148 Patent. Amazon promotes and advertises the use of its products.  
24 Examples of Amazon's promotional materials appear on the company's website.  
25 Amazon encourages its customers to purchase and use its products to communicate  
26 using the 802.11 Standard in a way that infringes the '148 Patent.

27 68. Amazon continues to infringe one or more claims of the '148 Patent,  
28 despite being aware of its infringement. Amazon's infringement has been, and

1 continues to be, willful and deliberate, and has caused and continues to cause  
2 substantial damage to Broadcom.

3 **COUNT 7**

4 **Infringement of U.S. Patent No. 6,766,389**

5 69. Amazon infringes at least claim 1 of the '389 Patent under at least 35  
6 U.S.C. § 271(a) and (b). Amazon makes, uses, sells, offers to sell, or imports into  
7 the United States products, systems, software, and/or methods, in whole or in part,  
8 that include a system on chip ("SoC") digital media processing chips, such as its  
9 FireTV and Echo, that practices each and every limitation of at least claim 1 of the  
10 '389 Patent.

11 70. Claim 1 of the '389 Patent is directed to an integrated circuit. The  
12 integrated circuit comprises (1) at least one processor coupled to a bus; (2) a cache  
13 memory coupled to the bus to cache data for the integrated circuit; (3) a memory  
14 controller coupled to the bus; (4) a bridge circuit coupled to the bus; and (5) at least  
15 one interface circuit to couple to a network external to the integrated circuit, the at  
16 least one interface circuit also coupled to the bridge circuit to allow the bridge  
17 circuit to initiate transactions onto the bus for data transfer between the bus and the  
18 at least one interface circuit.

19 71. The Amazon FireTV uses a Mediatek MT8173 SoC media processing  
20 chip. The Amazon Echo uses a Texas Instruments DM3725 digital media  
21 processing chip. Both the Fire TV and the Echo include an integrated circuit that  
22 includes at least one processor coupled to a bus; a cache memory coupled to the bus  
23 to cache data for the integrated circuit; a memory controller coupled to the bus; a  
24 bridge circuit coupled to the bus; and at least one interface circuit to couple to an  
25 external network. The bridge circuit is also coupled to the interface circuit to allow  
26 the bridge circuit to initiate transactions onto the bus for data transfer between the  
27 bus and interface circuit.  
28



1 the media content based on the device profile received by the first server.

2 78. The Amazon CloudFront and Elastic Transcoder product utilizes  
3 “origin” and “edge” servers to deliver media content. The origin servers, such as an  
4 Amazon S3 “bucket,” hold digital content such as digital video or image files. The  
5 digital content files can be transcoded into formats that are compatible with  
6 particular end user devices before the files are sent to end user devices. The digital  
7 files are transcoded from an original format into one or more other file formats.  
8 The transcoded files are sent to edge servers before being sent to end user devices.

9 79. In the Amazon CloudFront and Elastic Transcoder products, a first  
10 server receives a device profile of a first communications device. A second server  
11 operatively coupled to the first server receives media content destined for the first  
12 communications device, the second server being operatively coupled to the first  
13 communications device via a network. The second server reformats the media  
14 content based on the device profile received by the first server.

15 80. Amazon has had notice of the '295 Patent and of its infringement of  
16 the '295 Patent since at least the filing of this complaint.

17 81. On information and belief, Amazon also induces infringement by its  
18 customers of at least claim 12 of the '295 Patent. Amazon promotes and advertises  
19 the use of the Amazon CloudFront and Elastic Transcoder. Examples of Amazon's  
20 promotional materials appear on the company's website. Amazon encourages its  
21 customers to use its products and services to transcode and deliver digital content  
22 in a way that infringes the '295 Patent.

23 82. Amazon continues to infringe one or more claims of the '295 Patent,  
24 despite being aware of its infringement. Amazon's infringement has been, and  
25 continues to be, willful and deliberate, and has caused and continues to cause  
26 substantial damage to Broadcom.

27  
28

**COUNT 9**

**Infringement of U.S. Patent No. 8,284,844**

1  
2  
3 83. Amazon infringes at least claim 1 of the '844 Patent under at least 35  
4 U.S.C. § 271(a) and (b). Amazon makes, uses, sells, offers to sell, or imports into  
5 the United States products, systems, software, and/or methods, in whole or in part,  
6 that decode digital video data, such as its Fire TV, that practices each and every  
7 limitation of at least claim 1 of the '844 Patent.

8 84. Claim 1 of the '844 Patent is directed to a digital media decoding  
9 system. The system comprises (1) a processor adapted to control a decoding  
10 process; and (2) a hardware accelerator coupled to the processor and adapted to  
11 perform a decoding function on a digital media data stream, wherein the accelerator  
12 is configurable to perform the decoding function according to a plurality of  
13 decoding methods.

14 85. The Amazon Fire TV product is a digital media decoding system. The  
15 Fire TV utilizes a MediaTek MT8173 SoC. The processor in the MT8173 is  
16 adapted to control a decoding process, and the chip has a hardware accelerator  
17 coupled to the processor and adapted to perform a decoding function on a digital  
18 media system. The accelerator is configurable to perform the decoding function  
19 according to a plurality of decoding methods.

20 86. On information and belief, other Amazon products similarly infringe  
21 one or more claims of the '844 Patent. Such products include Amazon's Fire  
22 tablets.

23 87. Amazon has had notice of the '844 Patent and of its infringement of  
24 the '844 Patent since at least the filing of this complaint.

25 88. On information and belief, Amazon also induces infringement by its  
26 customers of at least claim 1 of the '844 Patent. Amazon promotes and advertises  
27 the use of its Amazon Fire TV. Examples of Amazon's promotional materials  
28 appear on the company's website. Amazon encourages its customers to purchase

1 and use its products decode digital media in a way that infringes the '844 Patent.

2 89. Amazon continues to infringe one or more claims of the '844 Patent,  
3 despite being aware of its infringement. Amazon's infringement will continue to be  
4 willful and deliberate, and has caused and continues to cause substantial damage to  
5 Broadcom.

### 6 COUNT 10

#### 7 **Infringement of U.S. Patent No. 6,501,480**

8 90. Amazon infringes at least claim 3 of the '480 Patent under at least 35  
9 U.S.C. § 271(a) and (b). Amazon makes, uses, sells, offers to sell, or imports into  
10 the United States products, systems, software, and/or methods, in whole or in part,  
11 that that reformats media content for delivery to user devices, such as the Amazon  
12 Elastic Compute Cloud ("EC2") product, that practices each and every limitation of  
13 at least claim 3 of the '480 Patent.

14 91. Claim 3 of the '480 Patent is directed to a graphics accelerator that  
15 comprises an integrated circuit. The integrated circuit comprises (1) a local  
16 memory for storing graphics data, the graphics data including pixels; (2) a  
17 coprocessor for performing operations on a plurality of components of a pixel of the  
18 graphics data; and (3) a direct memory access (DMA) engine for transferring the  
19 graphics data between an external memory and the local memory, wherein the  
20 graphics accelerator is working on operands and producing outputs for one set of  
21 pixels, while the DMA engine is bringing in operands for a future set of pixel  
22 operations, and wherein the DMA engine transfers data from the external memory  
23 directly to each of a plurality of processing pipelines of the integrated circuit.

24 92. Amazon Web Services with graphics processors, such as those with  
25 the Nvidia GPU instances used in the EC2, infringe at least claim 3 of the '480  
26 Patent. The EC2 product utilizes a graphics accelerator that includes an integrated  
27 circuit. The integrated circuit in the Nvidia GPU used in the EC2 product includes  
28 a local memory for storing graphics data, the graphics data including pixels. The



1 integrated circuit further includes a coprocessor for performing operations on a  
2 plurality of components of a pixel of the graphics data, and a DMA engine for  
3 transferring the graphics data between an external memory and the local memory.  
4 The graphics accelerator works on operands and producing outputs for one set of  
5 pixels, while the DMA engine is bringing in operands for a future set of pixel  
6 operations, and the DMA engine transfers data from the external memory directly  
7 to each of a plurality of processing pipelines of the integrated circuit.

8 93. Amazon has had notice of the '480 Patent and of its infringement of  
9 the '480 Patent since at least the filing of this complaint.

10 94. On information and belief, Amazon also induces infringement by its  
11 customers of at least claim 3 of the '480 Patent. Amazon promotes and advertises  
12 the use of the Amazon EC2 product. Examples of Amazon's promotional materials  
13 appear on the company's website. Amazon encourages its customers to purchase  
14 and use its products to process digital media in a way that infringes the '480 Patent.

15 95. Amazon continues to infringe one or more claims of the '480 Patent,  
16 despite being aware of its infringement. Amazon's infringement will continue to be  
17 willful and deliberate, and has caused and continues to cause substantial damage to  
18 Broadcom.

### 19 COUNT 11

#### 20 **Infringement of U.S. Patent No. 6,341,375**

21 96. Amazon infringes at least claim 15 of the '375 Patent under at least 35  
22 U.S.C. § 271(a) and (b). Amazon makes, uses, sells, offers to sell, or imports into  
23 the United States products, systems, software, and/or methods, in whole or in part,  
24 that distributes video to user devices, such as its CloudFront product, that practice  
25 each and every limitation of at least claim 15 of the '375 Patent.

26 97. Claim 15 of the '375 Patent is directed to a method for distributing  
27 video. The method comprises the steps of (1) presenting a plurality of compressed  
28 data streams with a drive server to a control server in response to one or more first

1 control signals; (2) distributing said one or more compressed data streams received  
2 from said drive server with said control server to one or more decoder devices in  
3 response to one or more request signals; (3) decoding at least one of said one or  
4 more compressed data streams with said one or more decoders in response to  
5 receiving said one or more compressed data streams from said control server; and  
6 (4) presenting at least one signal selected from a decoded video signal and a  
7 decoded audio signal in response to decoding said at least one of said one or more  
8 compressed data streams, wherein at least one of said one or more decoders is  
9 disposed in a separate room from said control server and said driver server, wherein  
10 a first portion of a selected one of said compressed data streams is presented to one  
11 of said decoder devices and a second portion of said selected compressed data  
12 streams is presented to another of said decoder devices.

13 98. The Amazon CloudFront product utilizes “origin” and “edge” servers  
14 to deliver media content. The origin servers, such as an Amazon S3 “bucket,” hold  
15 digital content such as compressed digital video or image files. The CloudFront  
16 product distributes the one or more compressed data streams to one or more  
17 decoder devices that are supplied by Amazon or Amazon customers. Amazon  
18 hardware and/or software decode and display or cause the decoding and displaying  
19 of the compressed data streams and the presentation of a decoded video or audio  
20 signal. If Amazon does not perform the decoding and displaying steps of claim 15,  
21 Amazon directs and controls end users to perform the decoding and displaying  
22 steps, and conditions participation in an activity and receipt of a benefit upon the  
23 end users’ performance of the decoding and displaying steps, and establishes the  
24 manner and timing of that performance. The decoder devices are disposed in  
25 separate rooms from the drive server(s) and the control server(s). A first portion of  
26 a selected one of the compressed data streams is presented to one of the decoder  
27 devices, and a second portion of the selected compressed data stream is presented to  
28 another of the decoder devices.

1 99. Amazon has had notice of the '375 Patent and of its infringement of  
2 the '375 Patent since at least July 30, 2015.

3 100. Amazon also induces infringement by its customers of at least claim  
4 15 of the '375 Patent. Amazon promotes and advertises the use of its products.  
5 Examples of Amazon's promotional materials appear on the company's website.  
6 Amazon encourages its customers to purchase and use its products and services to  
7 distribute digital media in a way that infringes the '375 Patent.

8 101. Amazon continues to infringe one or more claims of the '375 Patent,  
9 despite being aware of its infringement. Amazon's infringement will continue to be  
10 willful and deliberate, and has caused and continues to cause substantial damage to  
11 Broadcom.

12 **PRAYER FOR RELIEF**

13 Broadcom requests that judgment be entered in its favor and against Amazon  
14 as follows:

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

17 b. Declaring that Amazon's infringement of '148, '387, '663, '389, '295,  
18 '636, '805, '087, '480, '844, and '375 Patents is willful and deliberate pursuant to  
19 35 U.S.C. §284;

20 c. Enjoining Amazon from further infringing the '389, '295, '480, '148,  
21 '844, and '375 Patents;

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

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

28

1 f. Ordering that Amazon is required to pay exemplary damages pursuant  
2 to 35 U.S.C. § 284; and

3 g. Awarding Broadcom such other costs and further relief as the Court  
4 deems just and proper.

5

6

7 Dated: September 23, 2016

ROBERT E. FREITAS  
JASON S. ANGELL  
JESSICA N. LEAL  
FREITAS ANGELL & WEINBERG LLP

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*/s/ Jason S. Angell*

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Jason S. Angell

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Attorneys for Plaintiffs  
Broadcom Corporation and  
Avago Technologies General IP  
(Singapore) Pte. Ltd.

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**DEMAND FOR JURY TRIAL**

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

Dated: September 23, 2016

ROBERT E. FREITAS  
JASON S. ANGELL  
JESSICA N. LEAL  
FREITAS ANGELL & WEINBERG LLP

*/s/ Jason S. Angell*  
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