QUINN EMANUEL URQUHART
& SULLIVAN, LLP
James R. Asperger (Bar No. 083188)
jimasperger@quinnemanuel.com
865 S. Figueroa St., 10th Floor
Los Angeles, California 90017
Telephone: (213) 443-3000
Facsimile: (213) 443-3100

Kevin P.B. Johnson (Bar No. 177129)
kevinjohnson@quinnemanuel.com
555 Twin Dolphin Drive, 5th Floor
Redwood Shores, California 94065
Telephone: (650) 801-5000
Facsimile: (650) 801-5100

Attorneys for Plaintiff the California Institute of Technology

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

The CALIFORNIA INSTITUTE OF TECHNOLOGY, a California corporation,

Plaintiff,

vs.

BROADCOM LIMITED, BROADCOM CORPORATION, AVAGO TECHNOLOGIES LIMITED, and APPLE INC.

Defendants.

CASE NO. 2:16-cv-3714

COMPLAINT FOR PATENT INFRINGEMENT

JURY TRIAL DEMANDED

Plaintiff the California Institute of Technology ("Caltech" or "Plaintiff"), by and through its undersigned counsel, complains and alleges against Broadcom Limited ("Broadcom Ltd."), Broadcom Corporation ("Broadcom Corp."), and Avago Technologies Limited ("Avago Technologies Ltd.") (collectively, "Broadcom") and Apple Inc. ("Apple") (collectively "Defendants") as follows:

NATURE OF THE ACTION

1. This is a civil action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 1 *et seq*.

2. Broadcom has infringed and continues to infringe, contributed to and continues to contribute to the infringement of, and/or actively induced and continues to induce others to infringe Caltech's U.S. Patent No. 7,116,710, U.S. Patent No. 7,421,032, U.S. Patent No. 7,916,781, and U.S. Patent No. 8,284,833 (collectively, "the Asserted Patents"). Apple has infringed and continues to infringe, contributed to and continues to contribute to the infringement of, and/or actively induced and continues to induce others to infringe the Asserted Patents. Broadcom and Apple have jointly infringed and continue to jointly infringe, jointly contributed to and continue to jointly contribute to the infringement of, and/or jointly actively induced and jointly continue to induce others to infringe the Asserted Patents.

3. Caltech is the legal owner by assignment of the Asserted Patents, which were duly and legally issued by the United States Patent and Trademark Office. Caltech seeks injunctive relief and monetary damages.

THE PARTIES

4. Caltech is a non-profit private university organized under the laws of the State of California, with its principal place of business at 1200 East California Boulevard, Pasadena, California 91125.

5. Caltech is a world-renowned science and engineering research and education institution, where extraordinary faculty and students seek answers to complex questions, discover new knowledge, lead innovation, and transform our

future. To date, 34 Caltech alumni and faculty have won a total of 35 Nobel Prizes. Caltech's 124-acre campus is located in Pasadena, California including 300 professorial faculty and 600 research scholars. The mission of Caltech is to expand human knowledge and benefit society through research integrated with education. Caltech investigates the most challenging, fundamental problems in science and technology in a singularly collegial, interdisciplinary atmosphere, while educating outstanding students to become creative members of society. Caltech's investment in research has led Caltech to have more patent invention disclosures per faculty member than any other university in the nation and to be consistently ranked as one of the top university patent portfolios in strength and number of patents issued.

6. On information and belief, Broadcom Ltd. is a corporation organized under the laws of the country of Singapore with its principal places of business at 1320 Ridder Park Dr., San Jose, California 95131 and 1 Yishun Avenue 7, Singapore 768923.

7. On information and belief, Broadcom Corp. is a California corporation with a principal place of business at 5300 California Avenue, Irvine, California 92617. On information and belief, Broadcom Corp. is an indirect subsidiary of Broadcom Ltd.

8. On information and belief, Avago Technologies Ltd. is a corporation organized under the laws of the country of Singapore with its principal places of business at 1320 Ridder Park Dr., San Jose, California 95131 and 1 Yishun Avenue 7, Singapore 768923. On information and belief, Avago Technologies Ltd. is an indirect subsidiary of Broadcom Ltd.

9. On information and belief, Apple Inc. is a corporation organized under the laws of the State of California, with its principal place of business at 1 Infinite Loop, Cupertino, California 95014.

JURISDICTION AND VENUE

10. This Court has jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331 and 1338(a).

11. Broadcom Ltd. is subject to this Court's personal jurisdiction. On information and belief, Broadcom Ltd. regularly conducts business in the State of California, including in the Central District of California, and has committed acts of patent infringement and/or contributed to or induced acts of patent infringement by others in this District and elsewhere in California and the United States. As such, Broadcom Ltd. has purposefully availed itself of the privilege of conducting business within this District; has established sufficient minimum contacts with this District such that it should reasonably and fairly anticipate being haled into court in this District; has purposefully directed activities at residents of this State; and at least a portion of the patent infringement claims alleged herein arise out of or are related to one or more of the foregoing activities.

12. Broadcom Corp. is subject to this Court's personal jurisdiction. On information and belief, Broadcom Corp. regularly conducts business in the State of California, including in the Central District of California, and has committed acts of patent infringement and/or contributed to or induced acts of patent infringement by others in this District and elsewhere in California and the United States. As such, Broadcom Corp. has purposefully availed itself of the privilege of conducting business within this District; has established sufficient minimum contacts with this District such that it should reasonably and fairly anticipate being haled into court in this District; has purposefully directed activities at residents of this State; and at least a portion of the patent infringement claims alleged herein arise out of or are related to one or more of the foregoing activities.

13. Avago Technologies Ltd. is subject to this Court's personal jurisdiction. On information and belief, Avago Technologies Ltd. regularly conducts business in the State of California, including in the Central District of

California, and has committed acts of patent infringement and/or contributed to or induced acts of patent infringement by others in this District and elsewhere in California and the United States. As such, Avago Technologies Ltd. has purposefully availed itself of the privilege of conducting business within this District; has established sufficient minimum contacts with this District such that it should reasonably and fairly anticipate being haled into court in this District; has purposefully directed activities at residents of this State; and at least a portion of the patent infringement claims alleged herein arise out of or are related to one or more of the foregoing activities.

14. Apple Inc. is subject to this Court's personal jurisdiction. On information and belief, Apple Inc. regularly conducts business in the State of California, including in the Central District of California, and has committed acts of patent infringement and/or contributed to or induced acts of patent infringement by others in this District and elsewhere in California and the United States. As such, Apple Inc. has purposefully availed itself of the privilege of conducting business within this District; has established sufficient minimum contacts with this District such that it should reasonably and fairly anticipate being haled into court in this District; has purposefully directed activities at residents of this State; and at least a portion of the patent infringement claims alleged herein arise out of or are related to one or more of the foregoing activities.

15. Venue is proper in this judicial district pursuant to 28 U.S.C. §§ 1391 and 1400 because Defendants regularly conduct business in this District, and certain of the acts complained of herein occurred in this District.

CALTECH'S ASSERTED PATENTS

16. On October 3, 2006, the United States Patent Office issued U.S. Patent No. 7,116,710, titled "Serial Concatenation of Interleaved Convolutional Codes Forming Turbo-Like Codes" (the "'710 patent"). A true and correct copy of the '710 patent is attached hereto as Exhibit A.

17. On September 2, 2008, the United States Patent Office issued U.S. Patent No. 7,421,032, titled "Serial Concatenation of Interleaved Convolutional Codes Forming Turbo-Like Codes" (the "'032 patent"). A true and correct copy of the '032 patent is attached hereto as Exhibit B. The '032 patent is a continuation of the application that led to the '710 patent.

18. On March 29, 2011, the United States Patent Office issued U.S. Patent No. 7,916,781, titled "Serial Concatenation of Interleaved Convolutional Codes Forming Turbo-Like Codes" (the "'781 patent"). A true and correct copy of the '781 patent is attached hereto as Exhibit C. The '781 patent is a continuation of the application that led to the '032 patent, which is a continuation of the application that led to the '710 patent.

19. On October 9, 2012, the United States Patent Office issued U.S. Patent No. 8,284,833, titled "Serial Concatenation of Interleaved Convolutional Codes Forming Turbo-Like Codes" (the "'833 patent"). A true and correct copy of the '833 patent is attached hereto as Exhibit D. The '833 patent is a continuation of the application that led to the '781 patent, which is a continuation of the application that led to the '032 patent, which is a continuation of the application that led to the '710 patent.

20. The Asserted Patents identify Hui Jin, Aamod Khandekar, and Robert J. McEliece as the inventors (the "Inventors").

21. Caltech is the owner of all right, title, and interest in and to each of the Asserted Patents with full and exclusive right to bring suit to enforce the Asserted Patents, including the right to recover for past damages and/or royalties.

22. The Asserted Patents are valid and enforceable.

BACKGROUND

Caltech's IRA Code Patents

23. The Asserted Patents disclose a seminal improvement to coding systems and methods. The Asserted Patents introduce a new type of error correction

codes, called "irregular repeat and accumulate codes" (or "IRA codes"). The claimed methods and apparatuses generate an IRA code from information bits of a message by reordering repeated instances of those bits in a randomized but known way, and then performing logical operations on the reordered bits. These IRA codes are at least as effective at correcting errors in transmissions as prior coding techniques, such as turbo codes, but use simpler encoding and decoding circuitry and provide other technical and practical advantages, allowing for improved transmission rates and performance. Indeed, the IRA codes disclosed in the Asserted Patents enable a transmission rate close to the theoretical limit.

24. The Asserted Patents implement these novel IRA codes using novel encoders and decoders. The claims in the Asserted Patents describe the error correction methods in ways that enable a person of ordinary skill in the art to implement them using simple circuitry, providing improved performance over prior art encoders and decoders.

25. In September 2000, the Inventors of the Asserted Patents published a paper regarding their invention, titled "Irregular Repeat-Accumulate Codes" for the Second International Conference on Turbo Codes attached hereto as Exhibit E. This paper has been widely cited by experts in the industry.

26. The Inventors' patents and publications describing IRA codes have been widely recognized and cited by academics and experts in the field of digital communications for their improvements over prior art error-correction codes. For example, a paper praising these IRA codes was published in August 2004 by Aline Roumy, Souad Guemghar, Giuseppe Caire, and Sergio Verdú in the IEEE Transactions on Information Theory. This paper, titled "Design Methods for Irregular Repeat-Accumulate Codes" and attached hereto as Exhibit F states:

> IRA codes are, in fact, special subclasses of both irregular LDPCs and irregular turbo codes. . . . IRA codes are an appealing choice because the encoder is extremely simple, their performance is quite competitive with that of turbo codes and

> LDPCs, and they can be decoded with a very-low-complexity iterative decoding scheme.

This paper also notes that, four years after publication of the Inventors' September 2000 paper, the Inventors were the only ones to propose a method to design IRA codes.

IEEE 802.11 Wi-Fi Standard

27. The IEEE has developed standards for wireless communications over local area networks (also referred to as "Wi-Fi"). Wi-Fi usage is widespread in modern electronic products, including smartphones, laptops, routers, televisions, cameras, cars and other devices that have wireless connections.

28. The IEEE Wi-Fi standards are set forth in IEEE 802.11. The 802.11 standardization process began in the 1990s and the first version of 802.11 was referred to as 802.11a. In the following years, subsequent versions of the 802.11 standard were adopted.

29. One of the key improvements to the 802.11n version of the standard involved a "High Throughput (HT)" mode that is implemented using a specific type of LDPC (Low-Density Parity Check) code. This LDPC code used in 802.11n implements Caltech's patented IRA code technology.

30. This key improvement to the 802.11n version of the standard was also incorporated into the subsequent 802.11ac version of the standard. The 802.11ac version describes a "Very High Throughput (VHT)" mode that implements Caltech's patented IRA code technology.

31. The High Throughput and Very High Throughput modes provide significant advantages over earlier versions of the 802.11 standard. These modes allow for faster data transmissions while at the same time reducing the complexity of the encoders and decoders required to process the IRA/LDPC signals.

32. The IRA/LDPC codes specified by the 802.11n and 802.11ac standards include (1) irregular repeat, and (2) an accumulate operations, meaning they are IRA codes.

Broadcom

33. Broadcom manufactures, uses, imports, offers for sale, and/or sells Wi-Fi products that incorporate IRA/LDPC encoders and/or decoders and infringe the Asserted Patents. Broadcom products that incorporate IRA/LDPC encoders and/or decoders and infringe the Asserted Patents include, but are not limited to, the Wi-Fi products listed in Appendix 1 ("Broadcom Accused Products").

34. Broadcom's sales and marketing materials confirm that these products use LDPC codes and are compliant with the 802.11n and/or 802.11ac standards. For example, Broadcom's materials state that its BCM4350 "5G WiFi 802.11ac Client," which upon information and belief is incorporated in the Apple iPhone 6S and 6S Plus, features "802.11ac-compliant . . . low-density parity check codes (LDPC)."

35. On information and belief, Broadcom's "sales and marketing strategy is to achieve design wins with industry leaders by providing quality, state-of the-art products and superior technical support" in the United States, including design wins and technical support for Wi-Fi products.

36. On information and belief, Broadcom "market[s] and sell[s] [its] products in the United States through a direct sales force" and also through "distributors and manufacturers' representatives."

37. On information and belief, Broadcom markets and sells Wi-Fi products to customers such as Apple with the knowledge that those products will be incorporated into other products and imported into and sold in the United States.

Apple

38. Apple manufactures, uses, imports, offers for sale, and/or sells Wi-Fi products that incorporate IRA/LDPC encoders and/or decoders and infringe the Asserted Patents. Apple products that incorporate IRA/LDPC encoders and/or

decoders and infringe the Asserted Patents include, but are not limited to, the following: iPhone SE, iPhone 6S, iPhone 6S Plus, iPhone 6, iPhone 6 Plus, iPhone 5C, iPhone 5S, iPhone 5, iPad Air, IPad Air 2, iPad Pro, iPad Mini 4, iPad Mini 3, iPad Mini 2, MacBookAir, Apple Watch and the products listed in Appendix 1 ("Apple Accused Products").

39. Apple has manufactured, used, imported, offered for sale, and/or sold products that incorporate IRA/LDPC encoders and/or decoders and infringe the Asserted Patents since approximately 2012. For example, Apple announced the release of the iPhone 5 in September 2012 in a press release titled: "Thinnest, Lightest iPhone Ever Features All-New Aluminum Design, Stunning 4-Inch Retina Display, A6 Chip & Ultrafast Wireless." On information and belief, the iPhone 5 incorporates a Broadcom BCM 4334 chip that is compliant with 802.11n and uses IRA/LDPC codes.

Broadcom's Relationship With Apple

40. Apple is one of Broadcom's largest customers. In 2012, 2013 and 2014, sales to Apple represented 14.6%, 13.3% and 14.0% of Broadcom Corp.'s net revenue, respectively. (Broadcom Corporation 2014 Form 10-K). During this timeframe, Broadcom's Wi-Fi products that incorporate IRA/LDPC encoders and decoders and infringe the Asserted Patents were incorporated into Apple's key products including iPhones, iPads, and Mac computers. On information and belief, sales from these Apple products generated hundreds of billions of dollars in revenue.

41. On information and belief, Broadcom markets, offers to sell, and sells its products to Apple in the United States and has secured numerous Apple design wins for its Wi-Fi products in the United States. Broadcom's Wi-Fi design wins for Apple products include design wins for iPhones, iPads, Mac computers, and the Apple Watch.

42. Broadcom and Apple are jointly and severally liable for infringement of the Asserted Patents through sales of the Broadcom Accused Products and the Apple Accused Products that incorporate Broadcom Accused Products. As such, Broadcom's and Apple's joint infringement of the Asserted Patents raise common questions of fact and law.

COUNT I

Infringement of the '710 Patent

43. Caltech re-alleges and incorporates by reference the allegations of the preceding paragraphs of this Complaint as if fully set forth herein.

44. In violation of 35 U.S.C. § 271, Broadcom has infringed and is currently infringing, directly and/or through intermediaries, the '710 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, products that practice at least claims 1, 8, 10-17, and 19-33 of the '710 patent. These products include the Broadcom Accused Products, and any other products that incorporate IRA/LDPC encoders and/or decoders. Broadcom has infringed and is currently infringing literally and/or under the doctrine of equivalents.

45. In violation of 35 U.S.C. § 271, Apple has infringed and is currently infringing, directly and/or through intermediaries, the '710 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, products that practice at least claims 1, 8, 10-17, and 19-33 of the '710 patent. These products include the Apple Accused Products and any other products that incorporate IRA/LDPC encoders and/or decoders. Apple has infringed and is currently infringing literally and/or under the doctrine of equivalents.

46. On information and belief, Broadcom and Apple have had actual knowledge of their infringement of the '710 patent since no later than the filing date of this Complaint.

47. Notwithstanding Broadcom's actual notice of infringement, Broadcom continues to sell the Broadcom Accused Products, directly and/or through intermediaries, to others such as Apple that make, use, sell, offer for sale, or import into the United States the Broadcom Accused Products or other products incorporating the Broadcom Accused Products with knowledge of or willful blindness to the fact that its actions will induce others, including but not limited to its customers, partners, and/or end users, to directly infringe the '710 patent. Broadcom induces others including Apple to infringe the '710 patent in violation of 35 U.S.C. § 271(b) by encouraging and facilitating others to perform actions that Broadcom knows to be acts of infringement of the '710 patent with intent that those performing the acts infringe the '710 patent. Upon information and belief, Broadcom, directly and/or through intermediaries, advertises and distributes the Broadcom Accused Products, publishes instruction materials, specifications and promotional literature describing the operation of the Broadcom Accused Products, offers technical assistance, training, and/or consulting services regarding the Broadcom Accused Products to their customers, partners, and/or end users. At least consumers, partners, and/or end users of these Broadcom Accused Products then directly infringe the '710 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Broadcom Accused Products or products incorporating the Broadcom Accused Products.

48. Notwithstanding Apple's actual notice of infringement, Apple continues to sell the Apple Accused Products, directly and/or through intermediaries, to others that make, use, sell, offer for sale, or import into the United States the Apple Accused Products with knowledge of or willful blindness to the fact that its actions will induce others, including but not limited to its customers, partners, and/or end users, to directly infringe the '710 patent. Apple induces others including its customers to infringe the '710 patent in violation of 35 U.S.C. § 271(b) by encouraging and facilitating others to perform actions that Apple knows to be

acts of infringement of the '710 patent with intent that those performing the acts infringe the '710 patent. Upon information and belief, Apple, directly and/or through intermediaries, advertises and distributes the Apple Accused Products, publishes instruction materials, specifications and promotional literature describing the operation of the Apple Accused Products, offers technical assistance, training, and/or consulting services regarding the Apple Accused Products to their customers, partners, and/or end users. At least consumers, partners, and/or end users of these Apple Accused Products then directly infringe the '710 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Apple Accused Products.

49. Upon information and belief, Broadcom knows that the Broadcom Accused Products are especially made or especially adapted for use in the infringement of the '710 patent. The infringing components of these products are not staple articles or commodities of commerce suitable for substantial non-infringing use, and the infringing components of these products are a material part of the invention of the '710 patent. Accordingly, in violation of 35 U.S.C. § 271(c), Broadcom is also contributing, directly and/or through intermediaries, to the direct infringement of the '710 patent by at least the customers such as Apple, partners, and/or end users of these Broadcom Accused Products. The customers such as Apple, partners, and/or end users of these Broadcom Accused Products directly infringe the '710 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Broadcom Accused Products or products incorporating the Broadcom Accused Products.

50. Upon information and belief, Apple knows that the Apple Accused Products are especially made or especially adapted for use in the infringement of the '710 patent. The infringing components of these products are not staple articles or commodities of commerce suitable for substantial non-infringing use, and the infringing components of these products are a material part of the invention of the

'710 patent. Accordingly, in violation of 35 U.S.C. § 271(c), Apple is also contributing, directly and/or through intermediaries, to the direct infringement of the '710 patent by at least the customers, partners, and/or end users of these Apple Accused Products. The customers, partners, and/or end users of these Apple Accused Products directly infringe the '710 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Apple Accused Products.

51. As but one example of Broadcom's contributory and/or induced infringement, Broadcom explicitly encourages customers such as Apple to use, sell, offer for sale and/or import into the United States products that infringe the '710 patent by incorporating Broadcom Accused Products. For example, Broadcom's website advertises that the BCM 4350 product implements the 802.11ac standard and highlights its use of "low-density parity check codes (LDPC)." On information and belief, through materials such as these, Broadcom actively encourages customers such as Apple, partners, and/or end users to infringe the '710 patent through at least the use, sale, offer for sale and importation of products that incorporate the Broadcom Accused Products into the United States knowing those acts to be infringement of the '710 patent with intent that those performing the acts infringe the '710 patent.

52. As but one example of Apple's contributory and/or induced infringement, Apple explicitly encourages its customers to infringe the '710 patent by using the Apple Accused Products. For example, Apple's website advertises that the iPhone 6, implements the 802.11n and 802.11ac standard. On information and belief, through materials such as these, Apple actively encourages customers, partners, and/or end user to infringe the '710 patent through at least the use of Apple Accused Products incorporating Broadcom Accused Products such as the iPhone 6, knowing those acts to be infringement of the '710 patent with intent that those performing the acts infringe the '710 patent.

53. Broadcom is not licensed or otherwise authorized to practice the claims of the '710 patent.

54. Apple is not licensed or otherwise authorized to practice the claims of the '710 patent.

55. By reason of Broadcom's and Apple's individual and joint infringement, Caltech has suffered, and will continue to suffer, substantial damages.

56. Caltech is entitled to recover from Broadcom and Apple the damages sustained as a result of their wrongful acts in an amount subject to proof at trial.

57. Broadcom's and Apple's continuing acts of infringement are irreparably harming and causing damage to Caltech, for which Caltech has no adequate remedy at law, and will continue to suffer such irreparable injury unless Broadcom's and Apple's continuing acts of infringement are enjoined by the Court. The hardships that an injunction would impose are less than those faced by Caltech should an injunction not issue. The public interest would be served by issuance of an injunction. Thus, Caltech is entitled to a preliminary and a permanent injunction against further infringement.

58. Broadcom's and Apple's infringement of the '710 patent is exceptional and entitles Caltech to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

COUNT II

Infringement of the '032 Patent

59. Caltech re-alleges and incorporates by reference the allegations of the preceding paragraphs of this Complaint as if fully set forth herein.

60. In violation of 35 U.S.C. § 271, Broadcom has infringed and is currently infringing, directly and/or through intermediaries, the '032 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, products that practice at least claims 1-8 and 10-22 of the '032 patent. These products include the Broadcom Accused Products, and any other

products that incorporate IRA/LDPC encoders and/or decoders. Broadcom has infringed and is currently infringing literally and/or under the doctrine of equivalents.

61. In violation of 35 U.S.C. § 271, Apple has infringed and is currently infringing, directly and/or through intermediaries, the '032 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, products that practice at least claims 1-8 and 10-22 of the '032 patent. These products include the Apple Accused Products and any other products that incorporate IRA/LDPC encoders and/or decoders. Apple has infringed and is currently infringing literally and/or under the doctrine of equivalents.

62. On information and belief, Broadcom and Apple have had actual knowledge of their infringement of the '032 patent since no later than the filing date of this Complaint.

63. Notwithstanding Broadcom's actual notice of infringement, Broadcom continues to sell the Broadcom Accused Products, directly and/or through intermediaries, to others such as Apple that make, use, sell, offer for sale, or import into the United States the Broadcom Accused Products or other products incorporating the Broadcom Accused Products with knowledge of or willful blindness to the fact that its actions will induce others, including but not limited to its customers, partners, and/or end users, to directly infringe the '032 patent. Broadcom induces others including Apple to infringe the '032 patent in violation of 35 U.S.C. § 271(b) by encouraging and facilitating others to perform actions that Broadcom knows to be acts of infringement of the '032 patent with intent that those performing the acts infringe the '032 patent. Upon information and belief, Broadcom, directly and/or through intermediaries, advertises and distributes the Broadcom Accused Products, publishes instruction materials, specifications and promotional literature describing the operation of the Broadcom Accused Products, offers technical assistance, training, and/or consulting services regarding the

Broadcom Accused Products to their customers, partners, and/or end users. At least consumers, partners, and/or end users of these Broadcom Accused Products then directly infringe the '032 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Broadcom Accused Products or products incorporating the Broadcom Accused Products.

64. Notwithstanding Apple's actual notice of infringement, Apple continues to sell the Apple Accused Products, directly and/or through intermediaries, to others that make, use, sell, offer for sale, or import into the United States the Apple Accused Products with knowledge of or willful blindness to the fact that its actions will induce others, including but not limited to its customers, partners, and/or end users, to directly infringe the '032 patent. Apple induces others including its customers to infringe the '032 patent in violation of 35 U.S.C. § 271(b) by encouraging and facilitating others to perform actions that Apple knows to be acts of infringement of the '032 patent with intent that those performing the acts infringe the '032 patent. Upon information and belief, Apple, directly and/or through intermediaries, advertises and distributes the Apple Accused Products, publishes instruction materials, specifications and promotional literature describing the operation of the Apple Accused Products, offers technical assistance, training, and/or consulting services regarding the Apple Accused Products to their customers, partners, and/or end users. At least consumers, partners, and/or end users of these Apple Accused Products then directly infringe the '032 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Apple Accused Products.

65. Upon information and belief, Broadcom knows that the Broadcom Accused Products are especially made or especially adapted for use in the infringement of the '032 patent. The infringing components of these products are not staple articles or commodities of commerce suitable for substantial non-infringing use, and the infringing components of these products are a material part

of the invention of the '032 patent. Accordingly, in violation of 35 U.S.C. § 271(c), Broadcom is also contributing, directly and/or through intermediaries, to the direct infringement of the '032 patent by at least the customers such as Apple, partners, and/or end users of these Broadcom Accused Products. The customers such as Apple, partners, and/or end users of these Broadcom Accused Products directly infringe the '032 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Broadcom Accused Products or products incorporating the Broadcom Accused Products.

66. Upon information and belief, Apple knows that the Apple Accused Products are especially made or especially adapted for use in the infringement of the '032 patent. The infringing components of these products are not staple articles or commodities of commerce suitable for substantial non-infringing use, and the infringing components of these products are a material part of the invention of the '032 patent. Accordingly, in violation of 35 U.S.C. § 271(c), Apple is also contributing, directly and/or through intermediaries, to the direct infringement of the '032 patent by at least the customers, partners, and/or end users of these Apple Accused Products. The customers, partners, and/or end users of these Apple Accused Products directly infringe the '032 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Apple Accused Products.

67. As but one example of Broadcom's contributory and/or induced infringement, Broadcom explicitly encourages customers such as Apple to use, sell, offer for sale and/or import into the United States products that infringe the '032 patent by incorporating Broadcom Accused Products. For example, Broadcom's website advertises that the BCM 4350 product implements the 802.11ac standard and highlights its use of "low-density parity check codes (LDPC)." On information and belief, through materials such as these, Broadcom actively encourages customers such as Apple, partners, and/or end users to infringe the '032 patent

through at least the use, sale, offer for sale and importation of products that incorporate the Broadcom Accused Products into the United States knowing those acts to be infringement of the '032 patent with intent that those performing the acts infringe the '032 patent.

68. As but one example of Apple's contributory and/or induced infringement, Apple explicitly encourages its customers to infringe the '032 patent by using the Apple Accused Products. For example, Apple's website advertises that the iPhone 6, implements the 802.11n and 802.11ac standard. On information and belief, through materials such as these, Apple actively encourages customers, partners, and/or end user to infringe the '032 patent through at least the use of Apple Accused Products incorporating Broadcom Accused Products such as the iPhone 6, knowing those acts to be infringement of the '032 patent with intent that those performing the acts infringe the '032 patent.

69. Broadcom is not licensed or otherwise authorized to practice the claims of the '032 patent.

70. Apple is not licensed or otherwise authorized to practice the claims of the '032 patent.

71. By reason of Broadcom's and Apple's individual and joint infringement, Caltech has suffered, and will continue to suffer, substantial damages.

72. Caltech is entitled to recover from Broadcom and Apple the damages sustained as a result of their wrongful acts in an amount subject to proof at trial.

73. Broadcom's and Apple's continuing acts of infringement are irreparably harming and causing damage to Caltech, for which Caltech has no adequate remedy at law, and will continue to suffer such irreparable injury unless Broadcom's and Apple's continuing acts of infringement are enjoined by the Court. The hardships that an injunction would impose are less than those faced by Caltech should an injunction not issue. The public interest would be served by issuance of

an injunction. Thus, Caltech is entitled to a preliminary and a permanent injunction against further infringement.

74. Broadcom's and Apple's infringement of the '032 patent is exceptional and entitles Caltech to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

COUNT III

Infringement of the '781 Patent

75. Caltech re-alleges and incorporates by reference the allegations of the preceding paragraphs of this Complaint as if fully set forth herein.

76. In violation of 35 U.S.C. § 271, Broadcom has infringed and is currently infringing, directly and/or through intermediaries, the '781 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, products that practice at least claims 3-19 and 21-22 of the '781 patent. These products include the Broadcom Accused Products, and any other products that incorporate IRA/LDPC encoders and/or decoders. Broadcom has infringed and is currently infringing literally and/or under the doctrine of equivalents.

77. In violation of 35 U.S.C. § 271, Apple has infringed and is currently infringing, directly and/or through intermediaries, the '781 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, products that practice at least claims 3-19 and 21-22 of the '781 patent. These products include the Apple Accused Products and any other products that incorporate IRA/LDPC encoders and/or decoders. Apple has infringed and is currently infringing literally and/or under the doctrine of equivalents.

78. On information and belief, Broadcom and Apple have had actual knowledge of their infringement of the '781 patent since no later than the filing date of this Complaint.

79. Notwithstanding Broadcom's actual notice of infringement, Broadcom continues to sell the Broadcom Accused Products, directly and/or through intermediaries, to others such as Apple that make, use, sell, offer for sale, or import into the United States the Broadcom Accused Products or other products incorporating the Broadcom Accused Products with knowledge of or willful blindness to the fact that its actions will induce others, including but not limited to its customers, partners, and/or end users, to directly infringe the '781 patent. Broadcom induces others including Apple to infringe the '781 patent in violation of 35 U.S.C. § 271(b) by encouraging and facilitating others to perform actions that Broadcom knows to be acts of infringement of the '781 patent with intent that those performing the acts infringe the '781 patent. Upon information and belief, Broadcom, directly and/or through intermediaries, advertises and distributes the Broadcom Accused Products, publishes instruction materials, specifications and promotional literature describing the operation of the Broadcom Accused Products, offers technical assistance, training, and/or consulting services regarding the Broadcom Accused Products to their customers, partners, and/or end users. At least consumers, partners, and/or end users of these Broadcom Accused Products then directly infringe the '781 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Broadcom Accused Products or products incorporating the Broadcom Accused Products.

80. Notwithstanding Apple's actual notice of infringement, Apple continues to sell the Apple Accused Products, directly and/or through intermediaries, to others that make, use, sell, offer for sale, or import into the United States the Apple Accused Products with knowledge of or willful blindness to the fact that its actions will induce others, including but not limited to its customers, partners, and/or end users, to directly infringe the '781 patent. Apple induces others including its customers to infringe the '781 patent in violation of 35 U.S.C. § 271(b) by encouraging and facilitating others to perform actions that Apple knows to be

acts of infringement of the '781 patent with intent that those performing the acts infringe the '781 patent. Upon information and belief, Apple, directly and/or through intermediaries, advertises and distributes the Apple Accused Products, publishes instruction materials, specifications and promotional literature describing the operation of the Apple Accused Products, offers technical assistance, training, and/or consulting services regarding the Apple Accused Products to their customers, partners, and/or end users. At least consumers, partners, and/or end users of these Apple Accused Products then directly infringe the '781 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Apple Accused Products.

81. Upon information and belief, Broadcom knows that the Broadcom Accused Products are especially made or especially adapted for use in the infringement of the '781 patent. The infringing components of these products are not staple articles or commodities of commerce suitable for substantial non-infringing use, and the infringing components of these products are a material part of the invention of the '781 patent. Accordingly, in violation of 35 U.S.C. § 271(c), Broadcom is also contributing, directly and/or through intermediaries, to the direct infringement of the '781 patent by at least the customers such as Apple, partners, and/or end users of these Broadcom Accused Products. The customers such as Apple, partners, and/or end users of these Broadcom Accused Products directly infringe the '781 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Broadcom Accused Products or products incorporating the Broadcom Accused Products.

82. Upon information and belief, Apple knows that the Apple Accused Products are especially made or especially adapted for use in the infringement of the '781 patent. The infringing components of these products are not staple articles or commodities of commerce suitable for substantial non-infringing use, and the infringing components of these products are a material part of the invention of the

'781 patent. Accordingly, in violation of 35 U.S.C. § 271(c), Apple is also contributing, directly and/or through intermediaries, to the direct infringement of the '781 patent by at least the customers, partners, and/or end users of these Apple Accused Products. The customers, partners, and/or end users of these Apple Accused Products directly infringe the '781 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Apple Accused Products.

83. As but one example of Broadcom's contributory and/or induced infringement, Broadcom explicitly encourages customers such as Apple to use, sell, offer for sale and/or import into the United States products that infringe the '781 patent by incorporating Broadcom Accused Products. For example, Broadcom's website advertises that the BCM 4350 product implements the 802.11ac standard and highlights its use of "low-density parity check codes (LDPC)." On information and belief, through materials such as these, Broadcom actively encourages customers such as Apple, partners, and/or end users to infringe the '781 patent through at least the use, sale, offer for sale and importation of products that incorporate the Broadcom Accused Products into the United States knowing those acts to be infringement of the '781 patent with intent that those performing the acts infringe the '781 patent.

84. As but one example of Apple's contributory and/or induced infringement, Apple explicitly encourages its customers to infringe the '781 patent by using the Apple Accused Products. For example, Apple's website advertises that the iPhone 6, implements the 802.11n and 802.11ac standard. On information and belief, through materials such as these, Apple actively encourages customers, partners, and/or end user to infringe the '781 patent through at least the use of Apple Accused Products incorporating Broadcom Accused Products such as the iPhone 6, knowing those acts to be infringement of the '781 patent with intent that those performing the acts infringe the '781 patent.

85. Broadcom is not licensed or otherwise authorized to practice the claims of the '781 patent.

86. Apple is not licensed or otherwise authorized to practice the claims of the '781 patent.

87. By reason of Broadcom's and Apple's individual and joint infringement, Caltech has suffered, and will continue to suffer, substantial damages.

88. Caltech is entitled to recover from Broadcom and Apple the damages sustained as a result of their wrongful acts in an amount subject to proof at trial.

89. Broadcom's and Apple's continuing acts of infringement are irreparably harming and causing damage to Caltech, for which Caltech has no adequate remedy at law, and will continue to suffer such irreparable injury unless Broadcom's and Apple's continuing acts of infringement are enjoined by the Court. The hardships that an injunction would impose are less than those faced by Caltech should an injunction not issue. The public interest would be served by issuance of an injunction. Thus, Caltech is entitled to a preliminary and a permanent injunction against further infringement.

90. Broadcom's and Apple's infringement of the '781 patent is exceptional and entitles Caltech to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

COUNT IV

Infringement of the '833 Patent

91. Caltech re-alleges and incorporates by reference the allegations of the preceding paragraphs of this Complaint as if fully set forth herein.

92. In violation of 35 U.S.C. § 271, Broadcom has infringed and is currently infringing, directly and/or through intermediaries, the '833 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, products that practice at least claims 1-4, 6-11, and 13-14 of the '833 patent. These products include the Broadcom Accused Products, and any other

products that incorporate IRA/LDPC encoders and/or decoders. Broadcom has infringed and is currently infringing literally and/or under the doctrine of equivalents.

93. In violation of 35 U.S.C. § 271, Apple has infringed and is currently infringing, directly and/or through intermediaries, the '833 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, products that practice at least claims 1-4, 6-11, and 13-14 of the '833 patent. These products include the Apple Accused Products and any other products that incorporate IRA/LDPC encoders and/or decoders. Apple has infringed and is currently infringing literally and/or under the doctrine of equivalents.

94. On information and belief, Broadcom and Apple have had actual knowledge of their infringement of the '833 patent since no later than the filing date of this Complaint.

95. Notwithstanding Broadcom's actual notice of infringement, Broadcom continues to sell the Broadcom Accused Products, directly and/or through intermediaries, to others such as Apple that make, use, sell, offer for sale, or import into the United States the Broadcom Accused Products or other products incorporating the Broadcom Accused Products with knowledge of or willful blindness to the fact that its actions will induce others, including but not limited to its customers, partners, and/or end users, to directly infringe the '833 patent. Broadcom induces others including Apple to infringe the '833 patent in violation of 35 U.S.C. § 271(b) by encouraging and facilitating others to perform actions that Broadcom knows to be acts of infringement of the '833 patent with intent that those performing the acts infringe the '833 patent. Upon information and belief, Broadcom, directly and/or through intermediaries, advertises and distributes the Broadcom Accused Products, publishes instruction materials, specifications and promotional literature describing the operation of the Broadcom Accused Products, offers technical assistance, training, and/or consulting services regarding the

Broadcom Accused Products to their customers, partners, and/or end users. At least consumers, partners, and/or end users of these Broadcom Accused Products then directly infringe the '833 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Broadcom Accused Products or products incorporating the Broadcom Accused Products.

96. Notwithstanding Apple's actual notice of infringement, Apple continues to sell the Apple Accused Products, directly and/or through intermediaries, to others that make, use, sell, offer for sale, or import into the United States the Apple Accused Products with knowledge of or willful blindness to the fact that its actions will induce others, including but not limited to its customers, partners, and/or end users, to directly infringe the '833 patent. Apple induces others including its customers to infringe the '833 patent in violation of 35 U.S.C. § 271(b) by encouraging and facilitating others to perform actions that Apple knows to be acts of infringement of the '833 patent with intent that those performing the acts infringe the '833 patent. Upon information and belief, Apple, directly and/or through intermediaries, advertises and distributes the Apple Accused Products, publishes instruction materials, specifications and promotional literature describing the operation of the Apple Accused Products, offers technical assistance, training, and/or consulting services regarding the Apple Accused Products to their customers, partners, and/or end users. At least consumers, partners, and/or end users of these Apple Accused Products then directly infringe the '833 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Apple Accused Products.

97. Upon information and belief, Broadcom knows that the Broadcom Accused Products are especially made or especially adapted for use in the infringement of the '833 patent. The infringing components of these products are not staple articles or commodities of commerce suitable for substantial non-infringing use, and the infringing components of these products are a material part

of the invention of the '833 patent. Accordingly, in violation of 35 U.S.C. § 271(c), Broadcom is also contributing, directly and/or through intermediaries, to the direct infringement of the '833 patent by at least the customers such as Apple, partners, and/or end users of these Broadcom Accused Products. The customers such as Apple, partners, and/or end users of these Broadcom Accused Products directly infringe the '833 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Broadcom Accused Products or products incorporating the Broadcom Accused Products.

98. Upon information and belief, Apple knows that the Apple Accused Products are especially made or especially adapted for use in the infringement of the '833 patent. The infringing components of these products are not staple articles or commodities of commerce suitable for substantial non-infringing use, and the infringing components of these products are a material part of the invention of the '833 patent. Accordingly, in violation of 35 U.S.C. § 271(c), Apple is also contributing, directly and/or through intermediaries, to the direct infringement of the '833 patent by at least the customers, partners, and/or end users of these Apple Accused Products. The customers, partners, and/or end users of these Apple Accused Products directly infringe the '833 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority, the Apple Accused Products.

99. As but one example of Broadcom's contributory and/or induced infringement, Broadcom explicitly encourages customers such as Apple to use, sell, offer for sale and/or import into the United States products that infringe the '833 patent by incorporating Broadcom Accused Products. For example, Broadcom's website advertises that the BCM 4350 product implements the 802.11ac standard and highlights its use of "low-density parity check codes (LDPC)." On information and belief, through materials such as these, Broadcom actively encourages customers such as Apple, partners, and/or end users to infringe the '833 patent

through at least the use, sale, offer for sale and importation of products that incorporate the Broadcom Accused Products into the United States knowing those acts to be infringement of the '833 patent with intent that those performing the acts infringe the '833 patent.

100. As but one example of Apple's contributory and/or induced infringement, Apple explicitly encourages its customers to infringe the '833 patent by using the Apple Accused Products. For example, Apple's website advertises that the iPhone 6, implements the 802.11n and 802.11ac standard. On information and belief, through materials such as these, Apple actively encourages customers, partners, and/or end user to infringe the '833 patent through at least the use of Apple Accused Products incorporating Broadcom Accused Products such as the iPhone 6, knowing those acts to be infringement of the '833 patent with intent that those performing the acts infringe the '833 patent.

101. Broadcom is not licensed or otherwise authorized to practice the claims of the '833 patent.

102. Apple is not licensed or otherwise authorized to practice the claims of the '833 patent.

103. By reason of Broadcom's and Apple's individual and joint infringement, Caltech has suffered, and will continue to suffer, substantial damages.

104. Caltech is entitled to recover from Broadcom and Apple the damages sustained as a result of their wrongful acts in an amount subject to proof at trial.

105. Broadcom's and Apple's continuing acts of infringement are irreparably harming and causing damage to Caltech, for which Caltech has no adequate remedy at law, and will continue to suffer such irreparable injury unless Broadcom's and Apple's continuing acts of infringement are enjoined by the Court. The hardships that an injunction would impose are less than those faced by Caltech should an injunction not issue. The public interest would be served by issuance of

an injunction. Thus, Caltech is entitled to a preliminary and a permanent injunction against further infringement.

106. Broadcom's and Apple's infringement of the '833 patent is exceptional and entitles Caltech to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully prays for the following relief:

(a) A judgment that Defendants have infringed each and every one of the Asserted Patents;

(b) A preliminary and permanent injunction against Defendants, their respective officers, agents, servants, employees, attorneys, parent and subsidiary corporations, assigns and successors in interest, and those persons in active concert or participation with them, enjoining them from infringement, inducement of infringement, and contributory infringement of each and every one of the Asserted Patents, including but not limited to an injunction against making, using, selling, and/or offering for sale within the United States, and/or importing into the United States, any products, methods, equipment and/or services that infringe the Asserted Patents;

(c) Damages adequate to compensate Caltech for Defendants' infringement of the Asserted Patents pursuant to 35 U.S.C. § 284;

(d) Prejudgment interest;

(e) Post-judgment interest;

(f) A declaration that this Action is exceptional pursuant to 35 U.S.C. § 285, and an award to Caltech of its attorneys' fees, costs and expenses incurred in connection with this Action; and

(h) Such other relief as the Court deems just and equitable.

DATED: May 26, 2016

Respectfully submitted,

QUINN EMANUEL URQUHART & SULLIVAN, LLP

By /s/ *James R. Asperger*
James R. Asperger
Attorneys for Plaintiff California Institute of Technology

DEMAND FOR JURY TRIAL

Pursuant to Rule 38 of the Federal Rules of Civil Procedure and Local Rule 38-1 of this Court, Plaintiff hereby demands a trial by jury as to all issues so triable.

DATED: May 26, 2016

Respectfully submitted,

QUINN EMANUEL URQUHART & SULLIVAN, LLP

By /s/ *James R. Asperger*
James R. Asperger
Attorneys for Plaintiff California Institute of Technology