

**IN THE UNITED STATES DISTRICT COURT  
FOR THE WESTERN DISTRICT OF TEXAS  
WACO DIVISION**

**REDWOOD TECHNOLOGIES, LLC,**

**Plaintiff,**

**v.**

**BROADCOM, INC. AND BROADCOM  
CORPORATION,**

**Defendants.**

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**JURY TRIAL DEMANDED**

**C.A. NO. 25-cv-00008**

**PLAINTIFF’S COMPLAINT FOR PATENT INFRINGEMENT**

Plaintiff Redwood Technologies, LLC (“Redwood”) files this Complaint against Defendants Broadcom, Inc. and Broadcom Corporation (collectively, “Broadcom” or “Defendants”) for infringement of U.S. Patent No. 7,359,457 (the “’457 patent”), U.S. Patent No. 7,460,485 (the “’485 patent”), U.S. Patent No. 7,826,555 (the “’555 patent”), U.S. Patent No. 7,983,140 (the “’140 patent”), U.S. Patent No. 9,374,209 (the “’209 patent”), U.S. Patent No. 10,270,574 (the “’574 patent”), and U.S. Patent No. 7,701,920 (the “’920 patent”), collectively, the “Asserted Patents.”

**THE PARTIES**

1. Redwood Technologies, LLC is a Texas limited liability company, with a principal place of business at 812 West McDermott Dr. #1038, Allen, TX 75013.

2. On information and belief, Broadcom, Inc. a corporation organized under the laws of Delaware with a regular and established place of business at 6500 River Place Blvd., Austin, Texas 78730 (the “Broadcom Austin Office”). Broadcom, Inc. may be served through its registered agent for service: Corporation Service Company, located at 251 Little Falls Drive, Wilmington,

DE 19808. Broadcom, Inc. is a global infrastructure technology company providing Wi-Fi compliant devices. Broadcom, Inc. conducts business in Texas and within this District, directly or through intermediaries, including subsidiaries (e.g., Broadcom Corporation), distributors, affiliates, retailers, suppliers, integrators, customers, and others.

3. On information and belief, Broadcom Corporation is a California corporation with a regular and established place of business at the Broadcom Austin Office located at 6500 River Place Blvd., Austin, Texas 78730. Broadcom Corporation may be served through its registered agent for service: Corporation Service Company, 211 E. 7th Street Suite 620 Austin, Texas 78701. On information and belief, Broadcom Corporation is a wholly-owned and wholly-controlled subsidiary of Broadcom, Inc. Broadcom Corporation provides Wi-Fi compliant devices. Broadcom Corporation conducts business in Texas and within this District, directly or through intermediaries, including subsidiaries, distributors, affiliates, retailers, suppliers, integrators, customers, and others.

4. Defendants are engaged (including, as relevant, in the past) in making, using, selling, offering for sale, and/or importing, and/or inducing one another and their respective subsidiaries, affiliates, distributors, suppliers, retail partners, and customers in the making, using, selling, offering for sale, and/or importing throughout the United States, including within this District, the following products accused of infringement (the “Accused Products”):

- Broadcom devices that are compliant with IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax and/or IEEE 802.11be and/or Wi-Fi Multimedia as well as their components (e.g., hardware, software, and/or firmware), and processes related to the same (collectively, “Broadcom Wi-Fi compliant devices”); and
- Products comprising Broadcom Wi-Fi compliant devices.

5. On information and belief, Broadcom, Inc. controls (and has controlled) Broadcom Corporation as well as many other subsidiaries. On information and belief, Broadcom Corporation provides (and has provided) sales, distribution, research, and/or development support in the United States for its parent Broadcom, Inc., which owns Broadcom Corporation. Broadcom Corporation is, and has been, an agent of Broadcom, Inc. At the direction and control of Broadcom, Inc., its subsidiaries, including Broadcom Corporation, and/or other U.S.-based sales and/or distribution subsidiaries have made, used, sold, offered for sale, and/or imported and continue to make, use, sell, offer for sale, and/or import Accused Products in the United States and this District.

6. On information and belief Broadcom, Inc. controls (and has controlled) Broadcom Corporation. On information and belief, Broadcom Corporation and other Broadcom companies are, and have been, agents of Broadcom, Inc. For example, Broadcom, Inc. and Broadcom Corporation use the same name, logo, and trademark, further emphasizing that these companies are alter egos and/or agents of one another.

7. On information and belief, Broadcom, Inc. and Broadcom Corporation, along with their respective foreign and U.S.-based subsidiaries, affiliates, distributors, retail partners, and customers (which act as part of a global network and supply chain of overseas sales and manufacturing subsidiaries), have operated as agents of one another and vicariously as parts of the same business group to work in concert together and enter into agreements that are nearer than arm's length to provide (and have provided) a distribution channel of infringing products within this District and the U.S. nationally.

8. Broadcom, Inc. and Broadcom Corporation operate (and have operated) in agency with one another and their respective foreign and U.S.-based subsidiaries, affiliates, distributors, retail partners, suppliers, and customers, to provide a distribution channel of infringing products

within this District and the U.S. nationally. Broadcom, Inc. and Broadcom Corporation, individually and/or between one another and their respective agents and foreign and U.S.-based subsidiaries, affiliates, distributors, retail partners, suppliers, and customers, purposefully direct (and have directed) the Accused Products into established distribution channels within this District and the U.S. nationally.

9. On information and belief, Broadcom, Inc. and Broadcom Corporation, including their respective U.S.-based subsidiaries, affiliates, distributors, retail partners, and customers (which act as part of a global network and supply chain of overseas sales and manufacturing subsidiaries), have operated as agents of one another and vicariously as parts of the same business group to work in concert together and enter into agreements that are nearer than arm's length. Broadcom, Inc. and Broadcom Corporation, and their U.S.-based sales subsidiaries, individually and/or in concert, conduct business (and have conducted business) in the United States, including importing, using, testing, distributing, offering to sell, and selling the Accused Products that incorporate devices, systems, and processes that infringed the Asserted Patents in Texas and this District. *See Trois v. Apple Tree Auction Center, Inc.*, 882 F.3d 485, 490 (5th Cir. 2018) (“A defendant may be subject to personal jurisdiction because of the activities of its agent within the forum state...”); *see also Cephalon, Inc. v. Watson Pharmaceuticals, Inc.*, 629 F. Supp. 2d 338, 348 (D. Del. 2009) (“The agency theory may be applied not only to parents and subsidiaries, but also to companies that are ‘two arms of the same business group,’ operate in concert with each other, and enter into agreements with each other that are nearer than arm's length.”).

10. Through offers to sell, sales, imports, distributions, and other related agreements to transfer ownership of Defendants' Accused Products by and/or to affiliates, distributors, subsidiaries, suppliers, retail partners, customers, agents, and/or other Defendants, Defendants are

operating in (and have operated in) and maintaining (and maintained) a significant business presence in the U.S. and/or through their U.S. subsidiaries or agents, Defendants do business in the U.S., the state of Texas, and in this District.

11. Broadcom, Inc. and Broadcom Corporation are companies which together are “a global technology leader that designs, develops and supplies a broad range of semiconductor and infrastructure software solutions.” See <https://investors.broadcom.com/static-files/64f3ce85-082a-4bf5-9f1f-891931a648e8> at page 55. According to Broadcom, Inc’s 2023 10-K, “references to ‘Broadcom,’ ‘we,’ ‘our,’ and ‘us’ mean Broadcom and its consolidated subsidiaries...” *Id.*

12. Broadcom, Inc. and Broadcom Corporation share the same management, common ownership, advertising platforms, facilities, distribution chains and platforms, and infringing product lines and products involving related technologies. On information and belief, Defendants operate as a single business entity and/or in concert with each other to manufacture, sell, offer to sell, import, market, advertise, and/or otherwise promote the Accused Products in the United States, including in the State of Texas generally and this District in particular. On information and belief, Defendants share directors, executives, and employees.

13. Broadcom, Inc., as a single enterprise of multiple operating subsidiaries acting in consort with one another, has a common Board of Directors. The collective set of Broadcom entities, including Defendants, is managed, in consort, by a common management team to direct the manufacture, distribution, and sale of Broadcom products, including the Accused Products.

14. Broadcom Corporation is a wholly-owned subsidiary of Broadcom, Inc. and engages in sales, advertising, marketing, and/or research in the United States on behalf of, and under the control of Broadcom, Inc.

15. The Broadcom Corporation and Broadcom, Inc. own, manage, and/or operate a highly interactive website at [www.broadcom.com](http://www.broadcom.com). Broadcom Corporation is the registrant of the [www.broadcom.com](http://www.broadcom.com) website, which advertises and offers for sale the Accused Products within this District. *See* <https://www.broadcom.com/how-to-buy>. (“Customers who have Direct Purchasing Agreements with Broadcom must register to order online.”) The privacy agreement for the Broadcom website is provided by at least Broadcom, Inc. and Broadcom Corporation. *See* <https://www.broadcom.com/company/legal/privacy/policy> (“Broadcom, Inc. and its global affiliates and subsidiaries (collectively, “Broadcom”) value your privacy. This Privacy Notice (“Notice”) describes how Broadcom collects, stores, uses, and discloses your Personal Data. ... Broadcom Inc., Broadcom Corporation, Avago Technologies US Inc. and CA, Inc. are participating in the Data Privacy Framework (“DPF”) Program. As part of Broadcom’s participation in the Data Privacy Framework, if you have an inquiry or complaint regarding Broadcom’s privacy practices in relation to Broadcom’s DPF certification, Broadcom encourages you to first contact Broadcom at [data.privacy \(at\) broadcom.com](mailto:data.privacy@broadcom.com). In cases of onward transfers to third parties, Broadcom remains liable to you.”). A link to this Privacy Statement is included on all webpages of the [www.broadcom.com](http://www.broadcom.com) website.

16. On information and belief, Broadcom, Inc. and Broadcom Corporation employ numerous employees in Austin, TX at the Broadcom Austin Office, where such employees possess information relevant to issues involving the Accused Products. For example, over 870 employees of Defendants are located in the Austin, TX metropolitan area. <https://www.linkedin.com/company/broadcom/people/?facetGeoRegion=90000064>. The Broadcom employees located in Austin, TX identify their employer as Broadcom or Broadcom, Inc. *See, e.g.*, <https://www.linkedin.com/in/cameronbenitt/>; <https://www.linkedin.com/in/june->

hee-lee-461315103/. Individuals working at the Broadcom Austin Office consider Broadcom, Inc. and/or Broadcom Corporation their employers.

17. On information and belief, the Broadcom Austin Office operates under the Broadcom trademark owned and controlled by Broadcom, Inc. and/or Broadcom Corporation:



18. On information and belief, employees of Broadcom, Inc. and Broadcom Corporation work at the Broadcom Austin Office. One or more of these employees perform services for Broadcom, Inc. and Broadcom Corporation, and Broadcom, Inc. and Broadcom Corporation can control what will be done and how it will be done.

19. On information and belief, Broadcom, Inc. and/or Broadcom Corporation provides benefits, such as its Employee Stock Purchase Plan (ESPP), to the employees working at the Broadcom Austin Office. The ESPP allows Broadcom employees the opportunity to purchase its stock at a discount.

20. On information and belief, Broadcom, Inc. and Broadcom Corporation has control over job postings for the Broadcom Austin Office, and Broadcom, Inc. and Broadcom Corporation

advertise jobs located at the Broadcom Austin Office... *See, e.g.*, [https://broadcom.wd1.myworkdayjobs.com/en-US/External\\_Career/details/Services---Lifecycle-Support-Engineer\\_R020116?locations=877d747df71910021366662e2df00000](https://broadcom.wd1.myworkdayjobs.com/en-US/External_Career/details/Services---Lifecycle-Support-Engineer_R020116?locations=877d747df71910021366662e2df00000) (“Broadcom is seeking a master Services & Lifecycle Support Engineer ...”).

21. On information and belief, agents of Broadcom, Inc. and Broadcom Corporation work at the Broadcom Austin Office. On information and belief, Broadcom, Inc. and Broadcom Corporation have control over the individuals working at the Broadcom Austin Office. Broadcom, Inc. and Broadcom Corporation control how individuals perform their job responsibilities.

22. On information and belief, Broadcom, Inc. and Broadcom Corporation issued orders requiring that the individuals assigned to the Broadcom Austin Office return to the office. As part of this mandate, Broadcom, Inc. and Broadcom Corporation also implemented connect@BRCM which they deployed globally. On information and belief, each person working at the Broadcom Austin Office was and is required to use the connect@BRCM application throughout their workday to provide benefits such as contact tracing. The connect@BRCM application used this information to instruct individuals working at Broadcom facilities to quarantine. *See* <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/process-and-operations/us-acovid-success-story-bringing-workers-safely-back-to-on-site-at-broadcom.pdf> at 2. In other words, the connect@BRCM application provides immediate moment-to-moment control over how and where the individuals working at the Broadcom Austin Office performed their job.

23. On information and belief, Broadcom, Inc. and/or Broadcom Corporation also control the individuals working at the Broadcom Austin Office by making them adhere to its Code of Ethics and Business Conduct (the “Code”). Broadcom’s Code applies to “each of its



subsidiaries” and all associated “employees.”

<https://investors.broadcom.com/staticfiles/3fae5e73-6bcd-438d-83cc-29d62c01830d>,

Broadcom’s Code of Ethics and Business Conduct, p. 4. Broadcom, Inc. and/or Broadcom Corporation require all such entities and individuals to “abide by the requirements set forth in this Code.” *Id.* And Broadcom, Inc. and Broadcom Corporation have the right to audit compliance with the Code discipline for non-compliance with the Code, including reprimands and termination. *Id.* at 6. In other words, Broadcom, Inc. and Broadcom Corporation have the right to interrupt day-to-day operations to ensure compliance with its Code.

24. On information and belief, Broadcom, Inc. and/or Broadcom Corporation also control the individuals working at the Broadcom Austin Office by providing a common email domain administered by Broadcom, Inc. and/or Broadcom Corporation. On information and belief, all individuals working at the Broadcom Austin Office are given a @broadcom.com email address. This common domain provides Broadcom, Inc. and Broadcom Corporation with control over access to email for the individuals working at the Broadcom Austin Office as well as who they are allowed to communicate with. Broadcom, Inc. and Broadcom Corporation also control the equipment the individuals working at the Broadcom Austin Office use to perform their job functions.

25. On information and belief, Broadcom, Inc. and Broadcom Corporation consent to the individuals working at the Broadcom Austin Office acting as its agent. For example, Broadcom, Inc. and Broadcom Corporation give a @broadcom.com email address to the individuals working at the Broadcom Austin Office. Moreover, Broadcom, Inc. and Broadcom Corporation publish job openings for the Austin office, which indicates their relationship to the position.

26. On information and belief, Broadcom, Inc. and Broadcom Corporation also consent to the individuals working at the Broadcom Austin Office acting as their agent by allowing such individuals to use their name, corporate logo, and trademark in the course of their jobs.

27. On information and belief, Broadcom, Inc. and Broadcom Corporation also consent to the individuals working at the Broadcom Austin Office acting as its agent by allowing such individuals to identify it as their employer.

28. On information and belief, Broadcom, Inc. also consents to the individuals working at the Broadcom Austin Office acting as its agent by having its executives characterize the individuals working at the Austin office as “employees” when discussing them in interviews. *See* <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/process-and-operations/us-acovid-success-story-bringing-workers-safely-back-to-on-site-at-broadcom.pdf>, Interview with the Head of Enterprise End-user Services & Experience at Broadcom Inc., at 3 (describing the process of designing the connect@BRCM application and stating, “the app interface has to be so simple that we don’t have to teach every single employee to use it, right, because you are talking about a global workforce across many countries, over 16,000 employees.”). By characterizing the connect@BRCM application as a solution for its employees, Broadcom, Inc. consents to the agency of such individuals. This is particularly true, in light of the fact that Broadcom, Inc. requires such individuals to work in an office displaying Broadcom’s trademark, use an @broadcom.com email address, and be listed in its Employee Directory.

29. Furthermore, subsidiaries of Broadcom, Inc, including Broadcom Corporation, operate at the Broadcom Austin Office. Each of these subsidiaries is an agent of Broadcom, Inc. and/or Broadcom Corporation. On information and belief, Broadcom, Inc. and/or Broadcom Corporation have control over the entities operating at the Broadcom Austin Office. On

information and belief, Broadcom comprises 22 divisions. These divisions include Payment Security, PreAmp Components, Identity Management Security, Wireless Communications and Connectivity, Symantec Enterprise, Emulex Connectivity, Motion Control Products, Physical Layer Products, Optoelectronic Products, Wireless Semiconductor, Mainframe Software, Agile Operations, Optical Systems, Broadband Video Group, ASIC Products, Brocade Storage Networking, Isolation Products, Intellectual Property and Licensing, Data Center Solutions Group, Switch Products (sometimes referred to as the Core Switching Group), Mixed Signal ASICs, and Industrial Fiber Products. *See* Broadcom Inc. Company Overview at p. 15, available at <https://investors.broadcom.com/static-files/93d4483d-25cf-4c36-ac86-9cd33f9b07ee>. These divisions provide the goods and services that Broadcom, Inc. and Broadcom Corporation offers.

30. Further, Broadcom, Inc. and/or Broadcom Corporation have control over access to the products and services that the entities operating at the Broadcom Austin Office purportedly provide. For example, Broadcom, Inc. and/or Broadcom Corporation can instruct CA, Inc. to suspend service to a customer in the event that the customer owes money to Broadcom on a completely unrelated agreement. <https://techdocs.broadcom.com/content/dam/broadcom/techdocs/us/en/pdf/ca-enterprise-software/intelligent-automation/ca-plex/plex730/ca-plex-7-3-0-source.pdf> at 35.

31. On information and belief, Broadcom, Inc. and/or Broadcom Corporation control the use of the Broadcom trademarks by the entities operating at the Broadcom Austin Office. Consequently, the use of the marks by the entities at the Broadcom Austin Office is done subject to the control of Broadcom, Inc. and/or Broadcom Corporation.

32. On information and belief, Broadcom, Inc. and/or Broadcom Corporation consent to the entities operating at the Broadcom Austin Office acting as its agent. For example, Broadcom,

Inc. tasks its subsidiaries with conducting the business of its divisions. *See* Broadcom Inc. Company Overview at p. 15, available at <https://investors.broadcom.com/static-files/93d4483d-25cf-4c36-ac86-9cd33f9b07ee>. Further, Broadcom, Inc. and/or Broadcom Corporation consent to the entities at the Broadcom Austin Office operating under its trademark.

33. Additionally, on information and belief, Broadcom, Inc. and/or Broadcom Corporation consent to the entities operating at the Broadcom Austin Office acting as its agent by sharing a website with such entities.

34. On information and belief, Broadcom, Inc. and/or Broadcom Corporation also consent to the entities operating at the Broadcom Austin Office acting as its agent by listing workers for such entities in its Employee Directory. Similarly, Broadcom, Inc. and/or Broadcom Corporation consent to the agency relationship by listing the Broadcom Austin Office on its website under the “Contact Us” page. <https://www.broadcom.com/company/contact/locations>.

35. On information and belief, the entities operating at the Broadcom Austin Office consent to acting as the agent of Broadcom, Inc. and/or Broadcom Corporation. For example, the entities operating at the Broadcom Austin Office operate under the trademark and display signage of Broadcom, Inc. and Broadcom Corporation. This signage demonstrates consent to the agency relationship as it is intended to cause observers to associate the Broadcom Austin Office with Broadcom, Inc. and/or Broadcom Corporation.

36. Additionally, on information and belief, the entities operating at the Broadcom Austin Office consent to being an agent of Broadcom, Inc. and/or Broadcom Corporation by sharing a website with Broadcom, Inc. and/or Broadcom Corporation.

37. Broadcom, Inc. and/or Broadcom Corporation’s statements, conduct, and knowledge regarding the Broadcom Austin Office and the entities and individuals working there

create ostensible or apparent agency. On information and belief, Broadcom, Inc. and/or Broadcom Corporation permit the entities and individuals working at the Broadcom Austin Office to use its trade name and trademark. Moreover, Broadcom, Inc. and/or Broadcom Corporation policy the use of these marks by unauthorized entities. This authorized usage of the Broadcom trademark and trade name at the Broadcom Austin Office creates the impression that the office is operated by Broadcom, Inc. and/or Broadcom Corporation.

38. On information and belief, Broadcom, Inc. and Broadcom Corporation further the impression that they, individually or in concert, operate the Broadcom Austin Office by listing numerous Broadcom job postings for that office. Broadcom, Inc. and/or Broadcom Corporation's listing of the individuals working at the Broadcom Austin Office in its "Employee Directory" also lends to this ostensible agency. The repeated use of the Broadcom name and the utter lack of any other corporate name on the exterior of the Broadcom Austin Office creates an impression of agency in the public, including Plaintiff.

39. On information and belief, the Broadcom Austin Office is a place of Broadcom, Inc. and Broadcom Corporation. Broadcom, Inc. and Broadcom Corporation established and/or ratified the Broadcom Austin Office through its actions. For example, Broadcom, Inc. and Broadcom Corporation list the Broadcom Austin Office as a location on its website. Similarly, Broadcom's Employee Directory lists employees who work at the Broadcom Austin Office. And signs at the Broadcom Austin Office display Broadcom, Inc. and Broadcom Corporation's name and trademark.

40. On information and belief, Broadcom, Inc. and Broadcom Corporation control the Broadcom Austin Office. Broadcom, Inc. and Broadcom Corporation have control over the entities and employees that use the Broadcom Austin Office. On information and belief, Broadcom, Inc.

and Broadcom Corporation control the use of the Broadcom Austin Office. On information and belief, Broadcom employees and agents work at the Broadcom Austin Office on behalf of Broadcom, Inc. and/or Broadcom Corporation. On information and belief, Broadcom, Inc. and/or Broadcom Corporation exercise control over the Broadcom Austin Office by restricting access to the office. For example, Broadcom, Inc. and/or Broadcom Corporation require use of its connect@BRCM application and a security badge.

41. On information and belief, Broadcom, Inc. and/or Broadcom Corporation require workers at the Broadcom Austin Office to work at the office. For example, Broadcom, Inc. and/or Broadcom Corporation issued a policy requiring the workers at the Broadcom Austin Office to work at the office. *See, e.g.*, <https://www.mercurynews.com/2020/04/23/coronavirus-broadcom-said-to-be-bringing-employees-back-to-work-on-april-27/>.

42. On information and belief, one or more of the entities operating at the Broadcom Austin Office are alter egos of Broadcom, Inc and/or Broadcom Corporation. On information and belief, the entities operating at the Broadcom Austin Office lack distinct and adequate capitalization. On information and belief, Broadcom, Inc. and/or Broadcom Corporation do not maintain separate daily operations with the entities operating at the Broadcom Austin Office. On information and belief, Broadcom, Inc. and/or Broadcom Corporation is involved in the daily operations of the entities operating at the Broadcom Austin Office. On information and belief, no barriers exist between management of Broadcom, Inc. and/or Broadcom Corporation and the entities operating at the Broadcom Austin Office. On information and belief, Broadcom, Inc. and/or Broadcom Corporation do not apprise others of the alleged separateness between themselves and the entities operating at the Broadcom Austin Office. On information and belief, Broadcom, Inc. and/or Broadcom Corporation finance the entities operating at the Broadcom

Austin Office. On information and belief, Broadcom, Inc. and/or Broadcom Corporation share common accounting with the entities operating at the Broadcom Austin Office. On information and belief, Broadcom, Inc. and/or Broadcom Corporation share common business units with the entities operating at the Broadcom Austin Office. On information and belief, Broadcom, Inc. and Broadcom Corporation's officers and directors can and do set policies for the entities operating at the Broadcom Austin Office. On information and belief, Broadcom, Inc. and/or Broadcom Corporation and the entities operating at the Broadcom Austin Office do not hold separate shareholder meetings. On information and belief, Broadcom, Inc. and/or Broadcom Corporation and the entities operating at the Broadcom Austin Office file consolidated financial statements. On information and belief, Broadcom, Inc. and/or Broadcom Corporation use the property of the entities operating at the Broadcom Austin Office as its own. And Broadcom, Inc., Broadcom Corporation, and the entities at the Broadcom Austin Office operate under a single trade name: Broadcom



43. Prior to the filing of the Complaint, Redwood sent a letter on November 3, 2021 received by Broadcom, where Redwood attempted to engage Broadcom in licensing discussions related to the Asserted Patents for reasonable and non-discriminatory terms for a license to be taken in the absence of litigation. Indeed, Broadcom has known about each of the Asserted Patents since at least November 2021, when Broadcom received notice of its infringement of the Asserted Patents via the letter sent by Redwood.

44. Prior to the filing of the Complaint, Redwood sent several follow-up letters to Broadcom, including letters sent on January 4, 2022 and March 2, 2022, where Redwood again attempted to engage Broadcom in licensing discussions related to the Asserted Patents for reasonable and non-discriminatory terms for a license to be taken in the absence of litigation. Indeed, Broadcom has known about each of the Asserted Patents since at least May 2022 when Broadcom received the second notice of its infringement of the Asserted Patents via a letter sent on May 12, 2022 where Redwood again attempted to engage Broadcom in licensing discussions related to the Asserted Patents for reasonable and non-discriminatory terms for a license to be taken in the absence of litigation. Redwood again sent a follow-up letter to Broadcom on September 13, 2022 and two follow-up letters to Broadcom on September 14, 2022, where Redwood once again attempted to engaged Broadcom in licensing discussions related to the Asserted Patents for reasonable and non-discriminatory terms for a license to be taken in the absence of litigation. On September 19, 2022, Broadcom finally replied to Redwood via e-mail, where Redwood provided Broadcom access to its data room for the infringement charts of the Asserted Patents.

45. To date, Broadcom has not agreed to license the Asserted Patents for reasonable and non-discriminatory terms. From October 14, 2022 to November 17, 2022, Redwood sent



several follow-up emails to Broadcom offering to license the Asserted Patents to Broadcom for reasonable and non-discriminatory terms. Broadcom did not respond. On December 2, 2022, Redwood emailed Broadcom notifying Broadcom that Redwood considered any RAND obligations to the IEEE fulfilled because of Broadcom's apparent refusal to engage in any licensing dialogue.

46. Furthermore, as a member of the relevant standards-setting bodies, on information and belief, Broadcom is on notice of standard essential patents issued to other members of the standards bodies.

47. Broadcom's past and continuing making, using, selling, offering for sale, and/or importing, and/or inducing subsidiaries, affiliates, retail partners, distributors, manufacturers of end user devices, customers, and other third parties in the making, using, selling, offering for sale, and/or importing the Accused Products throughout the United States i) willfully infringe each of the Asserted Patents and ii) impermissibly take the significant benefits of Redwood's patented technologies without fair compensation to Redwood.

48. Broadcom is engaged in making, using, testing, selling, offering for sale, and/or importing, and/or induces subsidiaries, affiliates, retail partners, distributors, manufacturers of end user devices, customers, and other third parties in the making, using, selling, offering for sale, and/or importing throughout the United States, including within this District, the Accused Products, such as Wi-Fi compliant components as well as access points, mobile devices, automobiles, IoT devices and other products that include Broadcom's Wi-Fi compliant components, accused of infringement.

49. On information and belief, Broadcom Inc. and Broadcom Corporation operate as a unitary business venture and are jointly and severally liable for the acts of patent infringement alleged herein.

**JURISDICTION AND VENUE**

50. Plaintiff incorporates paragraphs 1 through 49 herein by reference.

51. This action arises under the patent laws of the United States, namely 35 U.S.C. §§ 271, 281, and 284-285, among others.

52. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

53. This Court has personal jurisdiction over Broadcom, Inc. and Broadcom Corporation in accordance with due process and/or the Texas Long Arm Statute because, among other things, Broadcom, Inc. and Broadcom Corporation do business in this State by, among other things, maintaining offices in this District, including maintaining its offices located at 6500 River Place Blvd., Austin, Texas 78730.

54. Further, this Court has personal jurisdiction over Broadcom, Inc. and Broadcom Corporation because each has engaged, and continues to engage, in continuous, systematic, and substantial activities within this State, including the substantial marketing, making, using, and sale of products and services within this State and this District. Indeed, this Court has personal jurisdiction over Broadcom, Inc. and Broadcom Corporation because each has committed acts giving rise to Redwood's claims for patent infringement within and directed to this District, has derived substantial revenue from its goods and services provided to individuals in this State and this District, and maintains regular and established places of business in this District, including their places of business at 6500 River Place Blvd., Austin, Texas 78730.

55. Relative to patent infringement, Broadcom, Inc. and Broadcom Corporation have committed and continue to commit acts in violation of 35 U.S.C. § 271, and have made, used, marketed, distributed, offered for sale, imported, and/or sold infringing products in this State, including in this District, and otherwise engaged in infringing conduct within and directed at, or from, this District. Such products have been and continue to be offered for sale, distributed to, sold, and used in this District, and the infringing conduct has caused, and continues to cause, injury to Redwood, including injury suffered within this District. These are purposeful acts and transactions in this State and this District such that Broadcom, Inc. and Broadcom Corporation reasonably should know and expect that they could be hauled into this Court because of such activities.

56. In addition, Broadcom, Inc. and Broadcom Corporation have knowingly induced and continues to knowingly induce infringement within this District by advertising, marketing, offering for sale, and/or selling infringing devices within this District, to consumers, customers, manufacturers, distributors, resellers, partners, and/or end users, and providing instructions, user manuals, advertising, marketing materials, hardware, software, and/or firmware which facilitate, direct or encourage the use of infringing functionality with knowledge thereof.

57. Venue is proper in this District under 28 U.S.C. §§ 1391 and 1400(b) because Broadcom, Inc. and Broadcom Corporation have regular and established places of business in this District and have committed acts of infringement in this District. Broadcom, Inc. and Broadcom Corporation's regular and established places of business in this District include, at least, their offices at 6500 River Place Blvd., Austin, Texas 78730.

58. With respect to the '457 patent and '140 patent, the Accused Products are devices that include, but are not limited to, Broadcom's devices and third party devices that include one or

more of Broadcom's devices that are compliant with IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax and/or IEEE 802.11be (e.g., the BCM20130, BCM20138, BCM43012, BCM43013, BCM43162, BCM5356, BCM5356U, BCM5357, BCM43224, BCM4323, BCM4331, BCM43460, BCM43525, BCM4356, BCM4360, BCM4366, BCM43684, BCM43694, BCM43720, BCM43740, BCM4375, BCM43752, BCM4389, BCM4390, BCM4392, BCM4398, BCM47186, BCM47452, BCM47622, BCM47722, BCM5358, BCM5358U, BCM63167, BCM63168, BCM63178, BCM63268, BCM63269, BCM6361, BCM6362, BCM6710, BCM6715, BCM6726, BCM67263, BCM6750, BCM6752, BCM6753, BCM6755, BCM6756, BCM6757, BCM6765, BCM94361, BCM943698, BCM94375, BCM94391 series) as well as their components (e.g., hardware, software, and/or firmware), and processes related to the same. With respect to the '555 patent, '209 patent, and '574 patent, the Accused Products are devices that include, but are not limited to, Broadcom's devices and third party devices that include one or more of Broadcom's devices that are compliant with IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax and/or IEEE 802.11be (e.g., the BCM43224, BCM4323, BCM4331, BCM43460, BCM43525, BCM4356, BCM4360, BCM4366, BCM43684, BCM43694, BCM43720, BCM43740, BCM4375, BCM43752, BCM4389, BCM4390, BCM4392, BCM4398, BCM47186, BCM47452, BCM47622, BCM47722, BCM5358, BCM5358U, BCM63167, BCM63168, BCM63178, BCM63268, BCM63269, BCM6361, BCM6362, BCM6710, BCM6715, BCM6726, BCM67263, BCM6750, BCM6752, BCM6753, BCM6755, BCM6756, BCM6757, BCM6765, BCM94361, BCM943698, BCM94375, BCM94391 series) as well as their components (e.g., hardware, software, and/or firmware), and processes related to the same. With respect to the '485 patent, the Accused Products are devices that include, but are not limited to, Broadcom's devices and third party devices that include one or

more of Broadcom's devices that are compliant with Wi-Fi Multimedia ("WMM") (e.g., the BCM4392, BCM4398, BCM943698, BCM94375, BCM94391 series) as well as their components (e.g., hardware, software, and/or firmware), and processes related to the same. With respect to the '920 patent, the Accused Products are devices that include, but are not limited to, Broadcom's devices and third party devices that include one or more of Broadcom's devices that are compliant with IEEE 802.11ad and/or IEEE 802.11ay (e.g., the BCM20130, BCM20138, chipset comprising the BCM20130 and/or BCM20138, and BCM56275 series) as well as their components (e.g., hardware, software, and/or firmware), and processes related to the same.<sup>1</sup>

**COUNT I**

(INFRINGEMENT OF U.S. PATENT NO. 7,359,457)

59. Plaintiff incorporates paragraphs 1 through 58 herein by reference.

60. Redwood is the assignee of the '457 patent, entitled "Transmission Apparatus, Reception Apparatus and Digital Radio Communication Method," with ownership of all substantial rights in the '457 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

61. The '457 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '457 patent issued from U.S. Patent Application No. 10/827,445.

62. Broadcom has and continues to directly and/or indirectly infringe one or more claims of the '457 patent in this judicial district and elsewhere in Texas and the United States.

63. Broadcom directly infringes the '457 patent via 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the Accused Products, their components and

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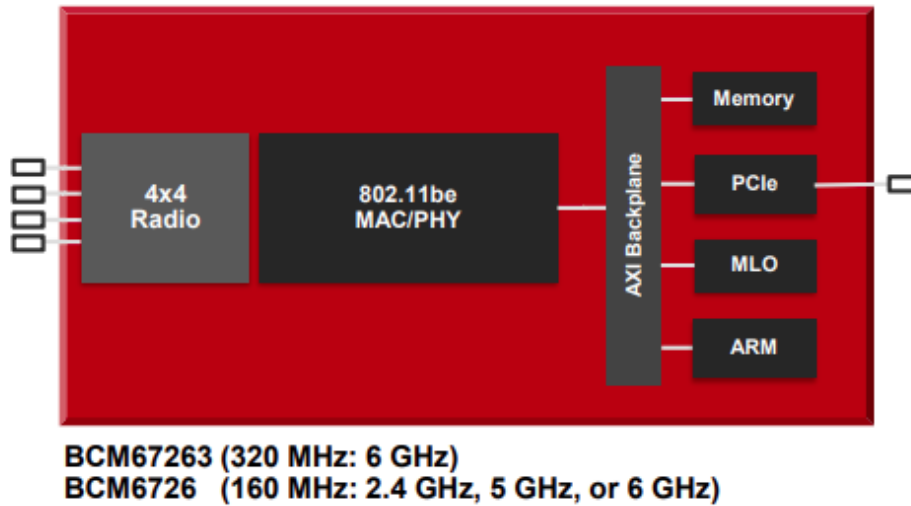
<sup>1</sup> Each of the relevant standards cited herein, and related to the Asserted Patents, are specifically incorporated into this Complaint.

processes, and/or products containing the same that incorporate the fundamental technologies covered by the '457 patent.

64. Furthermore, Broadcom, Inc. directly infringes the '457 patent through its direct involvement in the activities of its subsidiaries, including Broadcom Corporation. Such subsidiaries conduct activities that constitute direct infringement of the '457 patent under 35 U.S.C. § 271(a) by making, using, testing, offering for sale, selling, and/or importing those Accused Products, their components and processes, and/or products containing the same that incorporated the fundamental technologies covered by the '457 patent. Further, Defendants are vicariously liable for this infringing conduct of its subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, Broadcom, Inc, Broadcom Corporation, and their subsidiaries and related companies are essentially the same company, and Broadcom Inc. and Broadcom Corporation have the right and ability to control their subsidiaries infringing acts and receive a direct financial benefit from the infringement of its subsidiaries. Furthermore, on information and belief, Broadcom sells and makes the Accused Products outside of the United States, delivers those products to manufacturers, customers, distributors, and/or subsidiaries in the United States, or in the case that it delivers the Accused Products outside of the United States it does so intending and/or knowing that those products or products that are manufactured to include Broadcom's Accused Products are destined for the United States and/or designing those products for inclusion in other products to be placed on sale and used in the United States, thereby directly infringing the '457 patent. *See, e.g., Lake Cherokee Hard Drive Techs., L.L.C. v. Marvell Semiconductor, Inc.*, 964 F. Supp. 2d 653, 658 (E.D. Tex. 2013).

65. For example, Broadcom infringes claim 1 of the '457 patent via the Accused Products, including the BCM6726 series. The Accused Products, including the BCM6726 series,

each are compliant with IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax and/or IEEE 802.11be, and each comprise a transmission apparatus of claim 1. *See, e.g.*, <https://www.broadcom.com/products/wireless/wireless-lan-infrastructure/bcm67263> (Broadcom advertising that the BCXM6726 is MAC/PHY/radio device); <https://docs.broadcom.com/doc/6726X-PB1XX>:

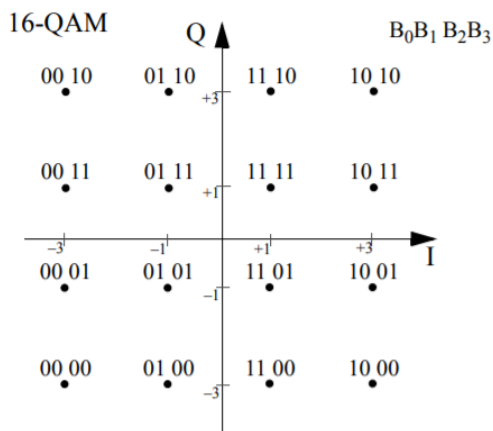


BCM67263 & BCM6726 Specifications	
Parameter	Details
Wi-Fi Standards	IEEE 802.11be (Wi-Fi 7) Release 1.0 compliant IEEE 802.11ax (Wi-Fi 6 & 6E) compliant IEEE 802.11 a/b/g/n/ac
Spatial Streams	Quad-stream 4x4
Spectral Bands	2.4 GHz 5 GHz 6 GHz

66. The Accused Products, including the BCM6726 series, each comprise circuitry and/or components (hardware and/or software) that determine a modulation system from among a plurality of modulation systems based on a communication situation. For example, the Accused Products utilize a Modulation and Coding Scheme (MCS) value that is used to determine the modulation, coding, and number of spatial channels based on information associated with a channel quality assessment. *See, e.g.*, Sections 19.3.5 and 19.3.13.4 of Part 11: Wireless LAN Medium Access Control (MAC) and Physical (PHY) Specifications of IEEE Std 802.11™ -2016

(“IEEE 802.11 2016”). Based on the results of the channel quality assessment, the Accused Products select an appropriate MCS value from a plurality of MCS values. *See, e.g.*, Section 19.3.5 and Table 19-27 of IEEE 802.11 2016.

67. The Accused Products, including the BCM6726 series, each comprise circuitry and/or components (hardware and/or software) that modulate a digital transmission signal according to the modulation system previously determined and generates a first symbol. The first symbol comprises a first quadrature baseband signal. For example, the Accused Products, including the BCM6726 series, generate a first data symbol (e.g., Data), comprising a first quadrature baseband signal (e.g., an OFDM signal before up-conversion to the carrier frequency), that is modulated according to the MCS value. *See, e.g.*, Section 19.3.5 and Figures 19-1 and 19-22 of IEEE 802.11 2016. The signal is a quadrature signal, in that it is expressed as a combination of sine and cosine waveforms. For example, when the 16-QAM modulation scheme is used, the following equation and constellation diagram are used to express the signal as a quadrature signal:



The signal is a quadrature signal because it is expressed with in-phase (I) and quadrature (Q) components. The signal is a baseband signal in that it has not been up-converted to the frequency of its intended carrier wave:



The transmitted signal is described in complex baseband signal notation. The actual transmitted signal is related to the complex baseband signal by the relation shown in Equation (19-1).

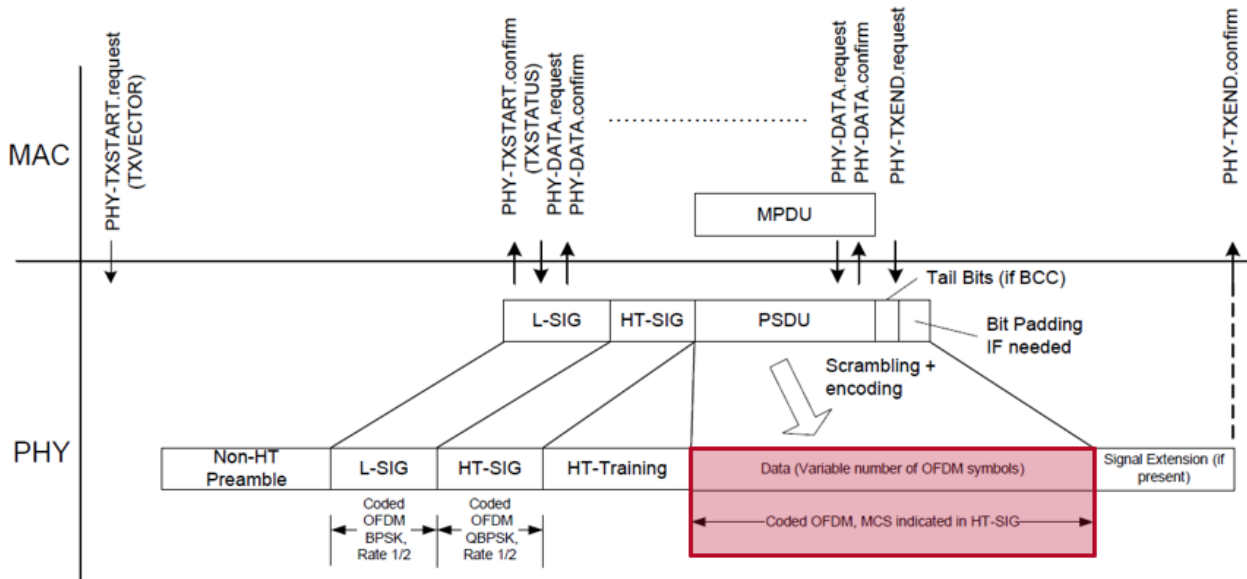
$$r_{RF}(t) = \text{Re}\{r(t)\exp(j2\pi f_c t)\} \tag{19-1}$$

where

$f_c$  is the center frequency of the carrier

The transmitted RF signal is derived by modulating the complex baseband signal, which consists of several fields. The timing boundaries for the various fields are shown in Figure 19-4.

The mandatory PHY transmit procedure feature of annotated Figure 19-22 of IEEE 802.11 2016 is illustrated below:



NOTE—This procedure does not describe the operation of optional features, such as LDPC or STBC

**Figure 19-22—PHY transmit procedure (HT-mixed format PPDU)**

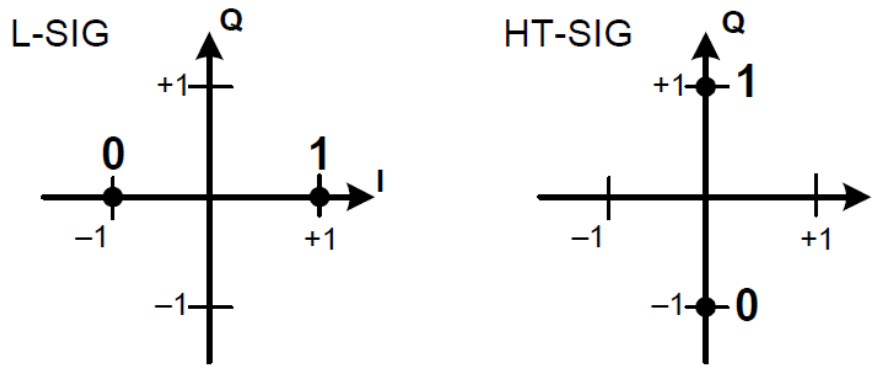
Furthermore, an annotated passage of Section 19.3.20 directed to the mandatory “PHY transmit procedure” for HT-mixed format PPDU is recited below:

### 19.3.20 PHY transmit procedure

There are three options for the transmit PHY procedure. The first two options, for which typical transmit procedures are shown in Figure 19-22 and Figure 19-23, are selected if the FORMAT field of the PHY-TXSTART.request(TXVECTOR) primitive is equal to HT\_MF or HT\_GF, respectively. These transmit procedures do not describe the operation of optional features, such as LDPC or STBC. The third option is to follow the transmit procedure in Clause 17 or Clause 18 if the FORMAT field is equal to NON\_HT. Additionally, if the FORMAT field is equal to NON\_HT, CH\_BANDWIDTH indicates

68. The option for the “transmit PHY procedure” as to the HT-mixed format PPDU is a mandatory feature of the standard. *See, e.g.,* [https://www.albany.edu/faculty/dsaha/teach/2019Spring\\_CEN574/slides/08\\_WLAN.pdf](https://www.albany.edu/faculty/dsaha/teach/2019Spring_CEN574/slides/08_WLAN.pdf) at slides 67-68 (the HT-mixed format PPDU is mandatory). Thus, the Accused Devices, including the BCM6726 series, must be configured pursuant to Figures 19-1 and 19-22, as described above.

69. The Accused Products, including the BCM6726 series, each comprise circuitry and/or components (hardware and/or software) that modulates the digital signal according to a predetermined modulation system and generates a second symbol. The second symbol comprises a second quadrature baseband signal. For example, the Accused Products, including the BCM6726 series, generate a second data symbol (e.g., the HT-SIG), comprising a second quadrature baseband signal (e.g., OFDM signal before up-conversion to the carrier frequency), that is modulated according to a predetermined modulation system (e.g., QBPSK). *See, e.g.,* Section 19.3.9.4.3 and Figures 19-1 and 19-22 of IEEE 802.11 2016. The signal is a quadrature signal, in that it is expressed as a combination of sine and cosine waveforms. For example, when the QBPSK modulation scheme is used, the following constellation diagram is used to express the signal as a quadrature signal:



**Figure 19-7—Data tone constellations in an HT-mixed format PPDU**

The signal is a quadrature signal because it is expressed with in-phase (I) and quadrature (Q) components. The signal is a baseband signal in that it has not been up-converted to the frequency of its intended carrier wave:

The transmitted signal is described in complex baseband signal notation. The actual transmitted signal is related to the complex baseband signal by the relation shown in Equation (19-1).

$$r_{RF}(t) = \text{Re}\{r(t)\exp(j2\pi f_c t)\} \quad (19-1)$$

where

$f_c$  is the center frequency of the carrier

The transmitted RF signal is derived by modulating the complex baseband signal, which consists of several fields. The timing boundaries for the various fields are shown in Figure 19-4.

70. The specific ways in which the Accused Products, including the BCM6726 series, are configured to support the aforementioned features of IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax and/or IEEE 802.11be are further detailed in confidential documents and/or source code that evidence infringement by the Accused Products, including the BCM6726 series, as to at least Claim 1 of the '457 patent.

71. Furthermore, the Accused Products, including the BCM6726 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '457 patent.

72. The technology discussion above and the exemplary Accused Products provide context for Plaintiff's infringement allegations.

73. The claims of the '457 patent are patent eligible under 35 U.S.C. § 101. The '457 patent is not directed to an ineligible abstract idea. For example, it is not a mathematical algorithm executed on a generic computer or a fundamental economic business practice. Instead, for example, it offers a technologically complex, particularized "transmission apparatus, reception apparatus and digital radio communication method capable of flexibly improving the data transmission efficiency and the quality of data." '457 patent, 1:59-63. The '457 patent provides a technical solution above, for example, by using a "[f]rame configuration determination section" that "judges the communication situation based on transmission path information" to determine a modulation system from a plurality of modulation systems, then generate symbols comprising quadrature baseband signals, including one symbol that is generated by modulating a digital transmission signal according to the selected modulation system and a second symbol that is generated by modulating the digital transmission signal according to a predetermined modulation system. '457 patent, 3:36-48; claim 1. That solution is reflected in the claims of the '457 patent such as independent claims 1 and 6.

74. At a minimum, Broadcom, Inc. and Broadcom Corporation have known of the '457 patent at least as early as the filing date of the Complaint. In addition, Broadcom, Inc. and Broadcom Corporation have known about the '457 patent since at least November 2021, when Broadcom, Inc. and Broadcom Corporation received notice of their infringement of the '457 patent via a letter sent by Redwood on November 3, 2021. Redwood sent several follow-up letters to Broadcom, including letters sent on January 4, 2022 and March 2, 2022. In May 2022, Broadcom, Inc. and Broadcom Corporation received further notice of their infringement of the '457 patent

when Redwood sent a second letter providing notice of their infringement on May 12, 2022. Redwood again sent a follow-up letter to Broadcom, Inc. and Broadcom Corporation on September 13, 2022 and two follow-up letters to Broadcom, Inc. and Broadcom Corporation on September 14, 2022. On September 19, 2022, Broadcom, Inc. and Broadcom Corporation finally replied to Redwood via e-mail, where Redwood provided Broadcom, Inc. and Broadcom Corporation access to its data room for the infringement chart of the '457 patent, where Broadcom, Inc. and Broadcom Corporation were provided further notice of their infringement. Based on information and belief, Broadcom, Inc. was on notice of the '457 patent from at least the foregoing dates that Broadcom Corporation was on notice of the '457 patent as a result of receiving actual or constructive notice from Broadcom Corporation, which is owned and controlled by its parent Broadcom, Inc.<sup>2</sup> Furthermore, Broadcom Corporation was on notice of the '457 patent from at least the foregoing dates that Broadcom, Inc. was on notice of the '457 patent as a result of receiving actual or constructive notice from Broadcom, Inc., which wholly owns and controls Broadcom Corporation, which is an agent and alter ego of Broadcom, Inc.<sup>3</sup>

75. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom has actively induced, under U.S.C. § 271(b), distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers to directly infringe one or more claims of the '457 patent by making, using, offering for sale, selling, and/or importing the Accused Products. Since at least the notice provided on the above-mentioned dates, Broadcom does so with knowledge, or

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<sup>2</sup> See e.g., *Nat'l Inst. for Strategic Tech. Acquisition & Commercialization v. Nissan of N. Am.*, No. 11-11039, 2012 U.S. Dist. LEXIS 117941, at \*14 (E.D. Mich. Aug. 21, 2012) ("It is also a reasonable inference that a Japanese parent company, Honda Motor Company, which received NISTAC's letter concerning the patents-in-suit, would communicate with its United States subsidiary, American Honda, about these patents and potential infringement thereof.").

<sup>3</sup> See FN 2, *supra*.

with willful blindness of the fact, that the induced acts constitute infringement of the '457 patent. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution channels for the Accused Products into and within the United States, manufacturing the Accused Products in conformity with U.S. laws and regulations, manufacturing the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions or manuals for the Accused Products to purchasers and prospective buyers, providing the accused functionalities via hardware, software, and/or firmware that are included in the Accused Products to manufacturers, purchasers, sellers, distributors, and/or end users, testing and certifying features related to infringing features in the Accused Products, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

76. On information and belief, despite having knowledge of the '457 patent and their infringement, Defendants specifically intended for others to import and sell products accused of infringing the '457 patent. For example, Defendants specifically intended for its U.S.-based subsidiaries or customers to import and sell products accused of infringing the '457 patent, including third party products that include Broadcom's Accused Products. On information and belief, Defendants instructed and encouraged the importers to import and/or sell products accused of infringing the '457 patent. On information and belief, the purchase and sale agreements between Broadcom, Inc., Broadcom Corporation, and the importers provide such instruction and/or encouragement. Further, on information and belief, Defendants' U.S.-based subsidiaries, affiliates,

employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the '457 patent in the United States.

77. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's contributory infringement pursuant to 35 U.S.C. § 271(c) includes offering to sell and/or license, selling and/or licensing, and/or providing within the United States, or importing into the United States, components of the patented invention of one or more claims of the '457 patent, constituting a material part of the invention. On information and belief, Broadcom knows and has known the same to be especially made or especially adapted for use in an infringement of the '457 patent by making the Accused Products in conformity with the relevant IEEE 802.11 standards, and such components are not a staple article or commodity of commerce suitable for substantial noninfringing use. For example, Broadcom offers to sell, sells, and/or licenses or otherwise provides hardware and/or software/firmware components of the Accused Products within the United States; the components constitute a material part of the claimed inventions of the '457 patent that are especially made or especially adapted for use in end user products that infringe the '457 patent; and the components are not a staple article or commodity of commerce suitable for substantial noninfringing use.

78. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's infringement pursuant to 35 U.S.C. § 271(f)(1) includes supplying or causing to be supplied in or from the United States all or a substantial portion of the components of the patented invention of one or more claims of the '457 patent, where such components are uncombined in whole or in part, in such manner as to actively induce the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. For example, Broadcom

supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components of the Accused Products that comprise all or a substantial portion of the components of the patented inventions of the '457 patent, where Broadcom actively induces the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. In another example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components of the Accused Products that comprise all or a substantial portion of the components of the patented inventions of the '457 patent, where Broadcom actively induces the combination of the hardware and/or software/firmware components with other components of an end user device outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution channels for the Accused Products into and within the United States, manufacturing the components of the Accused Products in conformity with U.S. laws and regulations, manufacturing the components of the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions or manuals or marketing materials regarding the combination of the hardware and software/firmware components, distributing or making available instructions or manuals or marketing materials regarding the combination of the hardware and/or software/firmware components with other components as part of making an end user device in part or in whole, testing and certifying features related to infringing features in the Accused Products, providing software



and/or firmware for the Accused Products to manufacturers, purchasers, sellers, distributors, and/or end users, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

79. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's infringement pursuant to 35 U.S.C. § 271(f)(2) includes supplying or causing to be supplied in or from the United States components of the patented invention of one or more claims of the '457 patent that are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use, where such components are uncombined in whole or in part, knowing that such components are so made or adapted and intending that such components will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. For example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components that comprise all or a substantial portion of the components of the patented inventions of the '457 patent, where such components are uncombined in whole or in part, knowing that such components are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use and intending that such components will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. In another example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components that comprise all or a substantial portion of the components of the patented inventions of the '457 patent, where such components are uncombined in whole or in part with other components of an end user device, knowing that such components are especially made

or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use and intending that such components will be combined with other components of an end user device outside of the United States in a manner that would infringe the patent if such combination occurred within the United States.

80. On information and belief, despite having knowledge of the '457 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '457 patent, Broadcom has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Broadcom's infringing activities relative to the '457 patent have been, and continue to be, willful, wanton, malicious, in bad-faith, deliberate, consciously wrongful, flagrant, characteristic of a pirate, and an egregious case of misconduct beyond typical infringement such that Plaintiff is entitled under 35 U.S.C. § 284 to enhanced damages up to three times the amount found or assessed.

81. Redwood has been damaged as a result of Broadcom's infringing conduct described in this Count. Broadcom is, thus, liable to Redwood in an amount that adequately compensates Redwood for Broadcom's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

## **COUNT II**

(INFRINGEMENT OF U.S. PATENT NO. 7,460,485)

82. Plaintiff incorporates paragraphs 1 through 81 herein by reference.

83. Redwood is the assignee of the '485 patent, entitled "Methods for Performing Medium Dedication in Order to Ensure the Quality of Service for Delivering Real-Time Data Across Wireless Network," with ownership of all substantial rights in the '485 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

84. The '485 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '485 patent issued from U.S. Patent Application No. 10/654,901.

85. Broadcom has and continues to directly and/or indirectly infringe one or more claims of the '485 patent in this judicial district and elsewhere in Texas and the United States.

86. Broadcom directly infringes the '485 patent via 35 U.S.C. § 271(a) by using and/or testing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '485 patent. As another example, Broadcom infringes each step of the one or more method claims of the '485 patent because the Broadcom Accused Products automatically, and without user modification, perform each of the claimed steps that are controlled by Broadcom.

87. Furthermore, Furthermore, Broadcom, Inc. directly infringes the '485 patent through its direct involvement in the activities of its subsidiaries, including Broadcom Corporation. Such subsidiaries conduct activities that constitute direct infringement of the '485 patent under 35 U.S.C. § 271(a) by using and/or testing those Accused Products, their components and processes, and/or products containing the same that incorporated the fundamental technologies covered by the '485 patent. Further, Defendants are vicariously liable for this infringing conduct of their respective subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, Broadcom, Inc., Broadcom Corporation, and their subsidiaries and related companies are essentially the same company, and Broadcom, Inc. and Broadcom Corporation have the right and ability to control their subsidiaries infringing acts and receive a direct financial benefit from the infringement of its subsidiaries. Furthermore, on information and belief, Broadcom, Inc. and Broadcom Corporation makes and sells the Accused Products outside

of the United States, delivers those products to manufacturers, customers, distributors, and/or subsidiaries in the United States, or in the case that it delivers the Accused Products outside of the United States it does so intending and/or knowing that those products or products that are manufactured to include Broadcom's Accused Products are destined for the United States and/or designing those products for inclusion in other products to be used in the United States, thereby directly infringing the '485 patent. *See, e.g., Lake Cherokee Hard Drive Techs., L.L.C. v. Marvell Semiconductor, Inc.*, 964 F. Supp. 2d 653, 658 (E.D. Tex. 2013).

88. Broadcom infringes claim 1 of the '485 patent via the Accused Products, including the BCM4398 series. The Accused Products, including the BCM4398 series, are compliant with the Wi-Fi Alliance WMM requirements. *See, e.g.,* <https://www.wi-fi.org/product-finder-results?keywords=BCM4398> (compliance with WMM (Wireless Multi-Media)):

**Certification ID: WFA127787**

Date of Last Certification: Sep 26, 2023

Brand: Broadcom Corporation

Category: Embedded Module

Product Name: BCM4398

Model Number: BCM4398

Total Variants: 2

**Variant #1 of 2 matches**

Date of Certification: Jan 4, 2024  
 Product Model Variant: Wi-Fi 7  
 Operating System: Linux  
 Frequency Band(s): 2.4 GHz; 5 GHz; 6 GHz

**Summary of Certifications for Variant #1**

CLASSIFICATION	PROGRAM
Security	Protected Management Frame WPA2™-Enterprise WPA2™-Personal WPA3™-Enterprise WPA3™-Personal
Spectrum & Regulatory Features Optimization	Spectrum & Regulatory Wi-Fi Agile Multiband™ WMM® Wi-Fi QoS Management™
Connectivity	Wi-Fi CERTIFIED 6® Wi-Fi CERTIFIED™ ac Wi-Fi CERTIFIED™ n Wi-Fi Enhanced Open™ Wi-Fi CERTIFIED™ a Wi-Fi CERTIFIED™ b Wi-Fi CERTIFIED™ g 2.4 GHz Spectrum Capabilities 5 GHz Spectrum Capabilities 6 GHz Spectrum Capabilities Wi-Fi CERTIFIED 7™

89. The Accused Products, including the BCM4398 series, perform a method for guaranteeing a quality of service (QoS) in delivering real-time data across a transmission medium.

*See, e.g.*, Section 4.3.10 of Part 11: Wireless LAN Medium Access Control (MAC) and Physical (PHY) Specifications of IEEE Std 802.11™ -2016 (“IEEE 802.11 2016”); Section 1.0 of the Wi-Fi Alliance Wi-Fi Multimedia Technical Specification, Version 1.2.0 (“WMM Specification V1.2.0”); <https://www.broadcom.com/products/wireless/wireless-lan-bluetooth/bcm4398>.

90. The Accused Products, including the BCM4398 series, each specify a traffic requirement for a traffic stream in accordance with a generic first specification. For example, the Accused Products utilize the traffic specification (“TSPEC”) element, which is a traffic requirement for a traffic stream based on QoS parameters for a particular Wi-Fi station (“STA”). *See, e.g.*, Section 9.4.2.30 of IEEE 802.11 2016 and Figure 14 of the WMM Specification V1.2.0.

91. The Accused Products, including the BCM4398 series, each transform the specified traffic requirement in accordance with a generic second specification based on the specified traffic requirement, an overhead requirement for the traffic stream and a condition of the transmission medium. For example, the Accused Products receive the TSPEC from an STA, and the Accused Products transform the TSPEC into medium time. *See, e.g.*, Section 3.5.2 of the WMM Specification V1.2.0. Medium Time is a traffic stream requirement utilized by the Accused Products which takes into consideration elements from the TSPEC, overhead requirements, and expected error performance on the medium. *See, e.g.*, Section K.4.1 of IEEE 802.11 2016 and A.3 of the WMM Specification V1.2.0.

92. The Accused Products, including the BCM4398 series, each adjust the generic second specification based on feedback obtained from monitoring the condition of the transmission medium. For example, the Accused Products adjust the medium time with the receipt of each new TSPEC. *See, e.g.*, Sections 3.5.1 and 3.5.3 of the WMM Specification V1.2.0.

93. The Accused Products, including the BCM4398 series, each aggregate a plurality of specifications for a plurality of traffic streams into a single specification to reduce resources required to maintain and process the plurality of specifications and overhead incurred in medium dedication. For example, the Accused Products aggregate the mean data rate and burst size for a plurality of traffic streams to generate a single token bucket specification, which allows the Accused Products to manage the STA's admitted flows more effectively. *See, e.g.*, Section 3.5.1 of the WMM Specification V1.2.0.

94. The Accused Products, including the BCM4398 series, each perform medium dedication in accordance with the medium dedication schedule to coordinate transmission of the plurality of traffic streams. For example, the Accused Products perform the medium dedication according to the schedule to coordinate transmission between a plurality of STAs with admitted traffic streams. *See, e.g.*, Section 3.5.2 of the WMM Specification V1.2.0.

95. The specific ways in which the Accused Products, including the BCM4398 series, are configured to support the aforementioned features of WMM are further detailed in confidential documents and/or source code that evidence infringement by the Accused Products, including the BCM6726 series, as to Claim 1 of the '485 patent.

96. Furthermore, the Accused Products, including the BCM4398 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '485 patent.

97. The technology discussion above and the exemplary Accused Products provide context for Plaintiff's infringement allegations.

98. The claims of the '485 Patent are patent eligible under 35 U.S.C. § 101. The '485 Patent is not directed to an ineligible abstract idea. For example, it is not a mathematical algorithm

executed on a generic computer or a fundamental economic business practice. Instead, it offers, for example, a technologically complex invention that delivers “time sensitive data, such as real-time Audio-Visual data for interactive applications, communicative applications and gaming, across an erroneous transmission medium.” ’485 patent, 1:10-13. The ’485 explains that “in order to meet the Quality of Service, data traffic need to be coordinated and scheduling of bandwidth dedication need to be performed.” ’485 patent, 1:13-15. The ’485 patent explains that its invention solves the problems identified by providing “a systematic way to perform medium dedication, by transforming traffic requirements into a form of specification that can incorporate the medium condition, by aggregating the specification to reduce overhead incurred, by merging individual medium dedication schedules for each stream into a unified medium dedication schedule, by performing medium dedication, by performing adaptation in order to tune the specification to be more reliable, and by performing monitoring and reporting of medium condition.” ’485 patent, 1:29-38. That solution is reflected for example in independent claim 1 of the ’485 patent.

99. At a minimum, Broadcom, Inc. and Broadcom Corporation have known of the ’485 patent at least as early as the filing date of the Complaint. In addition, Broadcom, Inc. and Broadcom Corporation have known about the ’485 patent since at least November 2021, when Broadcom, Inc. and Broadcom Corporation received notice of their infringement of the ’485 patent via a letter sent by Redwood on November 3, 2021. Redwood sent several follow-up letters to Broadcom, including letters sent on January 4, 2022 and March 2, 2022. In May 2022, Broadcom, Inc. and Broadcom Corporation received further notice of their infringement of the ’485 patent when Redwood sent a second letter providing notice of their infringement on May 12, 2022. Redwood again sent a follow-up letter to Broadcom, Inc. and Broadcom Corporation on September 13, 2022 and two follow-up letters to Broadcom, Inc. and Broadcom Corporation on September



14, 2022. On September 19, 2022, Broadcom, Inc. and Broadcom Corporation finally replied to Redwood via e-mail, where Redwood provided Broadcom, Inc. and Broadcom Corporation access to its data room for the infringement chart of the '485 patent, where Broadcom, Inc. and Broadcom Corporation were provided further notice of their infringement. Based on information and belief, Broadcom, Inc. was on notice of the '485 patent from at least the foregoing dates that Broadcom Corporation was on notice of the '485 patent as a result of receiving actual or constructive notice from Broadcom Corporation, which is owned and controlled by its parent Broadcom, Inc.<sup>4</sup> Furthermore, Broadcom Corporation was on notice of the '485 patent from at least the foregoing dates that Broadcom, Inc. was on notice of the '485 patent as a result of receiving actual or constructive notice from Broadcom, Inc., which wholly owns and controls Broadcom Corporation, which is an agent and alter ego of Broadcom, Inc.<sup>5</sup>

100. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom has actively induced, under U.S.C. § 271(b), distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers to directly infringe one or more claims of the '485 patent by testing and/or using the Accused Products. Since at least the notice provided on the above-mentioned dates, Broadcom does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '485 patent. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution channels for the Accused

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<sup>4</sup> See FN 2, *supra*.

<sup>5</sup> See FN 2, *supra*.

Products into and within the United States, manufacturing the Accused Products in conformity with U.S. laws and regulations, manufacturing the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions or manuals for the Accused Products to purchasers and prospective buyers, providing the accused functionalities via hardware, software, and/or firmware that are included in the Accused Products that are then used and/or tested by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers, testing and certifying features related to infringing features in the Accused Products, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

101. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's contributory infringement pursuant to 35 U.S.C. § 271(c) includes offering to sell and/or license, selling and/or licensing, and/or providing within the United States, or importing into the United States, components of the patented invention of one or more claims of the '485 patent, constituting a material part of the invention. On information and belief, Broadcom knows and has known the same to be especially made or especially adapted for use in an infringement of the '485 patent by making the Broadcom Accused Products in conformity with the relevant IEEE 802.11 standards, and such components are not a staple article or commodity of commerce suitable for substantial noninfringing use. For example, Broadcom offers to sell, sells, and/or licenses or otherwise provides hardware and/or software/firmware components of the Accused Products within the United States; the components constitute a material part of the claimed inventions of the '485 patent that are especially made or especially adapted for use in end user products that infringe the '485 patent; and the components are not a staple article or commodity of commerce suitable for substantial noninfringing use.

102. On information and belief, despite having knowledge of the '485 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '485 patent, Broadcom has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Broadcom's infringing activities relative to the '485 patent have been, and continue to be, willful, wanton, malicious, in bad-faith, deliberate, consciously wrongful, flagrant, characteristic of a pirate, and an egregious case of misconduct beyond typical infringement such that Plaintiff is entitled under 35 U.S.C. § 284 to enhanced damages up to three times the amount found or assessed.

103. Redwood has been damaged as a result of Broadcom's infringing conduct described in this Count. Broadcom is, thus, liable to Redwood in an amount that adequately compensates Redwood for Broadcom's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

### **COUNT III**

(INFRINGEMENT OF U.S. PATENT NO. 7,826,555)

104. Plaintiff incorporates paragraphs 1 through 103 herein by reference.

105. Redwood is the assignee of the '555 patent, entitled "MIMO-OFDM Transmission Device and MIMO-OFDM Transmission Method," with ownership of all substantial rights in the '555 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

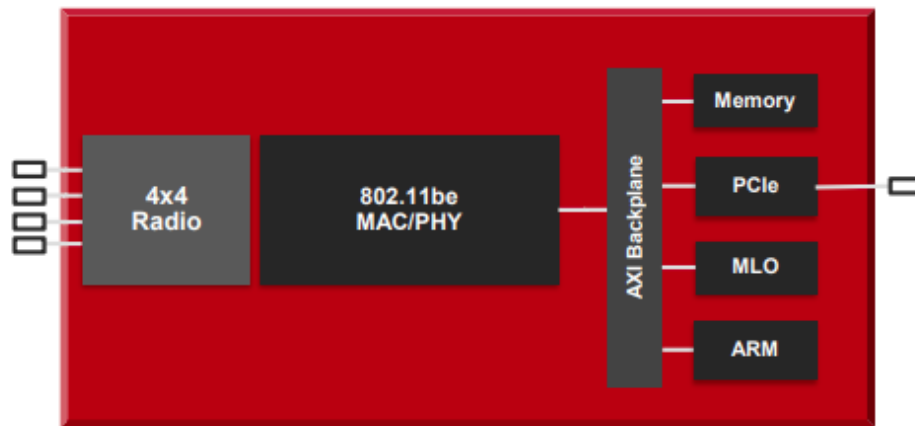
106. The '555 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '555 patent issued from U.S. Patent Application No. 11/577,791.

107. Broadcom has and continues to directly and/or indirectly infringe one or more claims of the '555 patent in this judicial district and elsewhere in Texas and the United States.

108. Broadcom directly infringes the '555 patent via 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '555 patent.

109. Furthermore, Broadcom, Inc. directly infringes the '555 patent through its direct involvement in the activities of its subsidiaries, including Broadcom Corporation. Such subsidiaries conduct activities that constitute direct infringement of the '555 patent under 35 U.S.C. § 271(a) by making, using, testing, offering for sale, selling, and/or importing those Accused Products, their components and processes, and/or products containing the same that incorporated the fundamental technologies covered by the '555 patent. Further, Defendants are vicariously liable for this infringing conduct of its subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, Broadcom, Inc, Broadcom Corporation, and their subsidiaries and related companies are essentially the same company, and Broadcom Inc. and Broadcom Corporation have the right and ability to control their subsidiaries infringing acts and receive a direct financial benefit from the infringement of its subsidiaries. Furthermore, on information and belief, Broadcom sells and makes the Accused Products outside of the United States, delivers those products to manufacturers, customers, distributors, and/or subsidiaries in the United States, or in the case that it delivers the Accused Products outside of the United States it does so intending and/or knowing that those products or products that are manufactured to include Broadcom's Accused Products are destined for the United States and/or designing those products for inclusion in other products to be placed on sale and used in the United States, thereby directly infringing the '555 patent. *See, e.g., Lake Cherokee Hard Drive Techs., L.L.C. v. Marvell Semiconductor, Inc.*, 964 F. Supp. 2d 653, 658 (E.D. Tex. 2013).

110. For example, Broadcom infringes claim 1 of the '555 patent via the Accused Products, including the BCM6726 series. The Accused Products, including the BCM6726 series, each are compliant with IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax and/or IEEE 802.11be, and each comprise a MIMO-OFDM transmission apparatus that transmits OFDM-modulated data symbols from a plurality of antennas in a data transmission period and transmits pilot symbols from specific carriers of the plurality of antennas in the data transmission period. See, e.g., <https://www.broadcom.com/products/wireless/wireless-lan-infrastructure/bcm67263> (Broadcom advertising that the BCM6726 is MAC/PHY/radio device); <https://docs.broadcom.com/doc/6726X-PB1XX>:



**BCM67263 (320 MHz: 6 GHz)**  
**BCM6726 (160 MHz: 2.4 GHz, 5 GHz, or 6 GHz)**

BCM67263 & BCM6726 Specifications	
Parameter	Details
Wi-Fi Standards	IEEE 802.11be (Wi-Fi 7) Release 1.0 compliant IEEE 802.11ax (Wi-Fi 6 & 6E) compliant IEEE 802.11 a/b/g/n/ac
Spatial Streams	Quad-stream 4x4
Spectral Bands	2.4 GHz 5 GHz 6 GHz

111. For example, each of the Accused Products, including the BCM6726 series, comprise a MIMO-OFDM transmission apparatus that transmits OFDM data symbols from two or more antennas in a data transmission period, such that each transmitted OFDM symbol contains

four pilot symbols, in a 20 MHz transmission, inserted in carrier positions -21, -7, 7, and 21. *See, e.g.*, Sections 17.3.5.9, 19.1.1, 19.1.2, and 19.3.11.10 and Equation 19-54 of IEEE 802.11 2016. In another example, the Accused Products transmit OFDM symbols and their corresponding pilot symbols in a data transmission period (*e.g.*, the 3.2  $\mu$ s DFT period). *See, e.g.*, Sections 19.3.6, 19.3.11.10, 19.3.21, 19.4.3, and Equation 19-90 of IEEE 802.11 2016.

112. The Accused Products, including the BCM6726 series, each comprise an OFDM signal forming section that forms OFDM signals to be transmitted from the plurality of antennas. For example, the Accused Products form HT-mixed format PPDU signals into OFDM symbols to be transmitted from the two or more antennas. *See, e.g.*, Sections 19.1.1 and 19.3.4 of IEEE 802.11 2016.

113. The Accused Products, including the BCM6726 series, each comprise a pilot symbol mapping section that assigns orthogonal sequences to same carriers of the OFDM signals of a same time period. For example, each of the Accused Products assigns orthogonal sequences to same carriers of the OFDM carriers of a same time period (*e.g.*, the 3.2  $\mu$ s DFT period) by inserting pilot symbols in carrier positions -21, -7, 7, and 21 in each OFDM symbol, such that each sequence of the four pilot symbols is orthogonal to a corresponding sequence in the OFDM symbols of another space-time stream. *See, e.g.*, Section 19.3.11.10 and Equation 19-54 of IEEE 802.11 2016.

114. When the OFDM signals are transmitted from two antennas of the Accused Products, including the BCM6726 series, the pilot symbol mapping section of the Accused Products forms the pilot carriers such that pilot signals of orthogonal sequences are used for same pilot carriers between a first antenna and a second antenna. For example, when there are two space-

time streams used for transmission by the Accused Products, the pilot sequences corresponding to stream one and stream two are orthogonal. *See, e.g.*, Table 19-19 of IEEE 802.11 2016.

115. When the OFDM signals are transmitted from two antennas of the Accused Products, including the BCM6726 series, the pilot symbol mapping section of the Accused Products forms the pilot carriers such that pilot signals of different sequences are used for different pilot carriers at each of the first antenna and the second antenna. For example, within transmissions from each antenna, pilot values differ from one pilot subcarrier to another pilot subcarrier and pilot values corresponding to a given carrier repeat over OFDM symbols, such that pilot values corresponding to different subcarriers at each antenna are different. *See, e.g.*, Table 19-19 of IEEE 802.11 2016.

116. When the OFDM signals are transmitted from two antennas of the Accused Products, including the BCM6726 series, the pilot symbol mapping section of the Accused Products, form the pilot carriers such that pilot signals of a same sequence are used at the first antenna and the second antenna. For example, a cyclically rotated version of a same sequence of pilot values (*e.g.*, 1, 1, -1, -1) is repeated for each of the two antennas. *See, e.g.*, Table 19-19 of IEEE 802.11 2016.

117. The specific ways in which the Accused Products, including the BCM6726 series, are configured to support the aforementioned features of IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax and/or IEEE 802.11be are further detailed in confidential documents and/or source code that evidence infringement by the Accused Products as to Claim 1 of the '555 patent.

118. Furthermore, the Accused Products, including the BCM6726 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '555 patent.

119. The technology discussion above and the exemplary Accused Products provide context for Plaintiff's infringement allegations.

120. The claims of the '555 patent are patent eligible under 35 U.S.C. § 101. The '555 patent is not directed to an ineligible abstract idea. For example, it is not a mathematical algorithm executed on a generic computer or a fundamental economic business practice. Instead, the '555 patent describes specific problems in signal transmission and communication involving multiple-input multiple-output (MIMO) OFDM communications and its claims are directed to specific ways of solving those problems. '555 patent, 2:19-45. In summary, "sufficient consideration has not been given to the method of transmitting symbols for transmission path estimation and symbols for frequency offset estimation to realize high accuracy frequency offset estimation, high accuracy transmission path fluctuation estimation and high accuracy synchronization/signal detection" for MIMO-OFDM communications. *Id.* As the '555 patent explains, "the present invention relates to a technology for realizing an ideal symbol configuration for ... MIMO-OFDM communication" to provide high accuracy frequency offset estimation, high accuracy transmission path estimation, and high accuracy signal detection. '555 patent, 1:8-12. The '555 patent claims specific technical solutions that achieve the aforementioned improvements. *See, e.g.*, '555 patent, Claim 1.

121. Specifically, the '555 patent describes that "orthogonal sequences are assigned to corresponding subcarriers among OFDM signals transmitted at the same time from the respective antennas in the time domain to form pilot carriers, so that, even when pilot symbols are multiplexed among a plurality of channels (antennas), it is possible to estimate frequency offset/phase noise with high accuracy. Furthermore, since pilot symbols of each channel can be extracted without using a channel estimator value (transmission path fluctuation estimation value), it is possible to simplify the configuration of the section for compensating for the frequency offset/phase noise."



'555 patent, 2:60-3:3. These specific solutions are recited in claim 1 of the '555 patent. This allows MIMO OFDM systems and devices to estimate frequency offset and/or phase noise with high accuracy even when pilot symbols are multiplexed on different channels. '555 patent, 10:56-60. In the conventional solution, when the same carriers of channel A and channel B are not orthogonal to each other, the estimation accuracy for frequency offset and/or phase noise by frequency offset/phase noise estimation decreases (signals become components of interference with each other), and therefore it is not possible to realize high accuracy frequency offset/phase noise compensation. '555 patent, 11:13-21. Furthermore, when a wireless LAN builds a system at the same frequency and in the same frequency band according to IEEE 802.11 and a spatial multiplexing MIMO system, this allows the frame configuration to be shared, and therefore it is possible to simplify the reception apparatus. '555 patent, 8:60-9:2. "Another important advantage is that since no channel estimation value (transmission path fluctuation estimation value) is required, it is possible to simplify the configuration of the part for compensating for the frequency offset and/or phase noise." '555 patent, 10:60-64. If pilot symbols of channel A and channel B are not orthogonal to each other, signal processing of MIMO demultiplexing is carried out, such that frequency offset and/or phase noise are then estimated. '555 patent, 10:64-11:3. On the other hand, when the claimed solutions are utilized, it is possible to compensate for frequency offset and/or phase noise before demultiplexing a signal. '555 patent, 11:3-7. In addition, the claimed solutions allow for the frequency offset and/or phase noise to be removed using pilot symbols even after demultiplexing the signal of channel A from the signal of channel B, thereby making it possible to compensate for the frequency offset and/or phase noise with higher accuracy. '555 patent, 11:7-12.

122. Furthermore, the '555 patent discloses additional improvements to symbol configurations for MIMO OFDM communications. Claim 1 of the '555 recites that “pilot signals of different sequences are used for different pilot carriers between a first antenna and a second antenna” for the transmission of the OFDM signals at a same time period. According to this improved configuration, when MIMO OFDM transmissions are carried out using more than one antenna, it minimizes an increase of transmission peak without degrading estimation accuracy for frequency offset/phase noise. '555 patent, 3:13-18, 10:1-7. Additionally, claim 1 of the '555 patent utilizes pilot signals of the same sequence for each of the antennas that are transmitted and/or received by a MIMO OFDM device at a same time period, which results in high accuracy synchronization/signal detection by the receiving apparatus. '555 patent, 14:39-48.

123. Thus, the '555 patent describes problems to be solved in MIMO OFDM digital signal communications as well as specific solutions for solving those problems that are reflected in the claims, including claim 1.

124. The claims of the '555 patent also survive step two of Alice because they recite an inventive concept that provides features that are more than well-understood, routine, conventional activity.

125. At a minimum, Broadcom, Inc. and Broadcom Corporation have known of the '555 patent at least as early as the filing date of the Complaint. In addition, Broadcom, Inc. and Broadcom Corporation have known about the '555 patent since at least November 2021, when Broadcom, Inc. and Broadcom Corporation received notice of the '555 patent via a letter sent by Redwood on November 3, 2021. Redwood sent several follow-up letters to Broadcom, including letters sent on January 4, 2022 and March 2, 2022. In May 2022, Broadcom, Inc. and Broadcom Corporation received further notice of their infringement of the '555 patent when Redwood sent a

second letter providing notice of their infringement on May 12, 2022. Redwood again sent a follow-up letter to Broadcom, Inc. and Broadcom Corporation on September 13, 2022 and two follow-up letters to Broadcom, Inc. and Broadcom Corporation on September 14, 2022. On September 19, 2022, Broadcom, Inc. and Broadcom Corporation finally replied to Redwood via e-mail, where Redwood provided Broadcom, Inc. and Broadcom Corporation access to its data room for the infringement chart of the '555 patent, where Broadcom, Inc. and Broadcom Corporation were provided further notice of their infringement. Based on information and belief, Broadcom, Inc. was on notice of the '555 patent from at least the foregoing dates that Broadcom Corporation was on notice of the '555 patent as a result of receiving actual or constructive notice from Broadcom Corporation, which is owned and controlled by its parent Broadcom, Inc.<sup>6</sup> Furthermore, Broadcom Corporation was on notice of the '555 patent from at least the foregoing dates that Broadcom, Inc. was on notice of the '555 patent as a result of receiving actual or constructive notice from Broadcom, Inc., which wholly owns and controls Broadcom Corporation, which is an agent and alter ego of Broadcom, Inc.<sup>7</sup>

126. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom has actively induced, under U.S.C. § 271(b), distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers to directly infringe one or more claims of the '555 patent by making, using, offering for sale, selling, and/or importing the Accused Products. Since at least the notice provided on the above-mentioned dates, Broadcom does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '555 patent. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors,

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<sup>6</sup> See FN 2, *supra*.

<sup>7</sup> See FN 2, *supra*.

customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution channels for the Accused Products into and within the United States, manufacturing the Accused Products in conformity with U.S. laws and regulations, manufacturing the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions or manuals for the Accused Products to purchasers and prospective buyers, providing the accused functionalities via hardware, software, and/or firmware that are included in the Accused Products to manufacturers, purchasers, sellers, distributors, and/or end users, testing and certifying features related to infringing features in the Accused Products, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

127. On information and belief, despite having knowledge of the '555 patent and their infringement, Defendants specifically intended for others to import and sell products accused of infringing the '555 patent. For example, Defendants specifically intended for its U.S.-based subsidiaries or customers to import and sell products accused of infringing the '555 patent. On information and belief, Defendants instructed and encouraged the importers to import and/or sell products accused of infringing the '555 patent. On information and belief, the purchase and sale agreements between Broadcom, Inc., Broadcom Corporation, and the importers provide such instruction and/or encouragement. Further, on information and belief, Defendants' U.S.-based subsidiaries, affiliates, employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the '555 patent in the United States.

128. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's contributory infringement pursuant to 35 U.S.C. § 271(c) includes offering to sell and/or license, selling and/or licensing, and/or providing within the United States, or importing into the United States, components of the patented invention of one or more claims of the '555 patent, constituting a material part of the invention. On information and belief, Broadcom knows and has known the same to be especially made or especially adapted for use in an infringement of the '555 patent by making the Accused Products in conformity with the relevant IEEE 802.11 standards, and such components are not a staple article or commodity of commerce suitable for substantial noninfringing use. For example, Broadcom offers to sell, sells, and/or licenses or otherwise provides hardware and/or software/firmware components of the Accused Products within the United States; the components constitute a material part of the claimed inventions of the '555 patent that are especially made or especially adapted for use in end user products that infringe the '555 patent; and the components are not a staple article or commodity of commerce suitable for substantial noninfringing use.

129. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's infringement pursuant to 35 U.S.C. § 271(f)(1) includes supplying or causing to be supplied in or from the United States all or a substantial portion of the components of the patented invention of one or more claims of the '555 patent, where such components are uncombined in whole or in part, in such manner as to actively induce the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. For example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components of the Accused Products that comprise all or a substantial portion

of the components of the patented inventions of the '555 patent, where Broadcom actively induces the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. In another example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components of the Accused Products that comprise all or a substantial portion of the components of the patented inventions of the '555 patent, where Broadcom actively induces the combination of the hardware and/or software/firmware components with other components of an end user device outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution channels for the Accused Products into and within the United States, manufacturing the components of the Accused Products in conformity with U.S. laws and regulations, manufacturing the components of the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions or manuals or marketing materials regarding the combination of the hardware and software/firmware components, distributing or making available instructions or manuals or marketing materials regarding the combination of the hardware and/or software/firmware components with other components as part of making an end user device in part or in whole, testing and certifying features related to infringing features in the Accused Products, providing software and/or firmware for the Accused Products to manufacturers, purchasers, sellers, distributors,

and/or end users, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

130. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's infringement pursuant to 35 U.S.C. § 271(f)(2) includes supplying or causing to be supplied in or from the United States components of the patented invention of one or more claims of the '555 patent that are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use, where such components are uncombined in whole or in part, knowing that such components are so made or adapted and intending that such components will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. For example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components that comprise all or a substantial portion of the components of the patented inventions of the '555 patent, where such components are uncombined in whole or in part, knowing that such components are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use and intending that such components will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. In another example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components that comprise all or a substantial portion of the components of the patented inventions of the '555 patent, where such components are uncombined in whole or in part with other components of an end user device, knowing that such components are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce

suitable for substantial noninfringing use and intending that such components will be combined with other components of an end user device outside of the United States in a manner that would infringe the patent if such combination occurred within the United States.

131. On information and belief, despite having knowledge of the '555 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '555 patent, Broadcom has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Broadcom's infringing activities relative to the '555 patent have been, and continue to be, willful, wanton, malicious, in bad-faith, deliberate, consciously wrongful, flagrant, characteristic of a pirate, and an egregious case of misconduct beyond typical infringement such that Plaintiff is entitled under 35 U.S.C. § 284 to enhanced damages up to three times the amount found or assessed.

132. Redwood has been damaged as a result of Broadcom's infringing conduct described in this Count. Broadcom is, thus, liable to Redwood in an amount that adequately compensates Redwood for Broadcom's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

#### **COUNT IV**

(INFRINGEMENT OF U.S. PATENT NO. 7,983,140)

133. Plaintiff incorporates paragraphs 1 through 132 herein by reference.

134. Redwood is the assignee of the '140 patent, entitled "Transmitting Apparatus, Receiving Apparatus, and Communication System for Formatting Data," with ownership of all substantial rights in the '140 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.



135. The '140 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '140 patent issued from U.S. Patent Application No. 11/004,256.

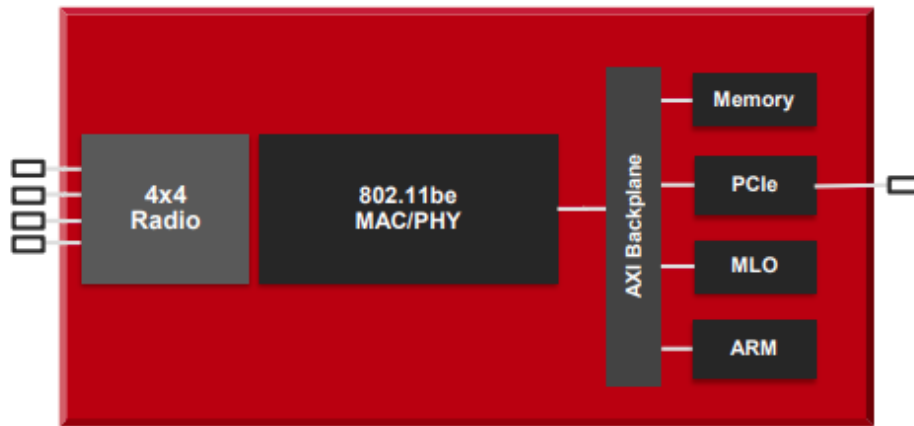
136. Broadcom has and continues to directly and/or indirectly infringe one or more claims of the '140 patent in this judicial district and elsewhere in Texas and the United States.

137. Broadcom directly infringes the '140 patent via 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '140 patent.

138. Furthermore, Broadcom, Inc. directly infringes the '140 patent through its direct involvement in the activities of its subsidiaries, including Broadcom Corporation. Such subsidiaries conduct activities that constitute direct infringement of the '140 patent under 35 U.S.C. § 271(a) by making, using, testing, offering for sale, selling, and/or importing those Accused Products, their components and processes, and/or products containing the same that incorporated the fundamental technologies covered by the '140 patent. Further, Defendants are vicariously liable for this infringing conduct of its subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, Broadcom, Inc, Broadcom Corporation, and their subsidiaries and related companies are essentially the same company, and Broadcom Inc. and Broadcom Corporation have the right and ability to control their subsidiaries infringing acts and receive a direct financial benefit from the infringement of its subsidiaries. Furthermore, on information and belief, Broadcom sells and makes the Accused Products outside of the United States, delivers those products to manufacturers, customers, distributors, and/or subsidiaries in the United States, or in the case that it delivers the Accused Products outside of the

United States it does so intending and/or knowing that those products or products that are manufactured to include Broadcom’s Accused Products are destined for the United States and/or designing those products for inclusion in other products to be placed on sale and used in the United States, thereby directly infringing the ’140 patent. *See, e.g., Lake Cherokee Hard Drive Techs., L.L.C. v. Marvell Semiconductor, Inc.*, 964 F. Supp. 2d 653, 658 (E.D. Tex. 2013).

139. For example, Broadcom infringes claim 1 of the ’140 patent via the Accused Products, including the BCM6726 series. The Accused Products, including the BCM6726 series, comprise a transmitting apparatus, in an orthogonal frequency division multiplexing communication system. *See, e.g.,* <https://www.broadcom.com/products/wireless/wireless-lan-infrastructure/bcm67263> (Broadcom advertising that the BCXM6726 is MAC/PHY/radio device); <https://docs.broadcom.com/doc/6726X-PB1XX>:



**BCM67263 (320 MHz: 6 GHz)**  
**BCM6726 (160 MHz: 2.4 GHz, 5 GHz, or 6 GHz)**

BCM67263 & BCM6726 Specifications	
Parameter	Details
Wi-Fi Standards	IEEE 802.11be (Wi-Fi 7) Release 1.0 compliant IEEE 802.11ax (Wi-Fi 6 & 6E) compliant IEEE 802.11 a/b/g/n/ac
Spatial Streams	Quad-stream 4x4
Spectral Bands	2.4 GHz 5 GHz 6 GHz

140. The Accused Products, including the BCM6726 series, each comprise circuitry and/or components (hardware and/or software) for converting a transmission signal into a transmission time slot. For example, the Accused Products, including the BCM6726 series, convert PSDUs into PPDUs. *See, e.g.*, Sections 17.3.1 and 17.3.2.1 of IEEE 802.11 2016.

141. The Accused Products, including the BCM6726 series, each comprise circuitry and/or components (hardware and/or software) for generating a frame that includes a series of  $n$  (greater than 1) time slots and a frame guard period added to the series of  $n$  time slots, where each time slot includes an effective symbol period and guard period added to the effective symbol period, where the length of the series of  $n$  time slots is less than the length of the frame. For example, each of the Accused Products, including the BCM6726 series, generates a PDU frame that comprises a series of time slots associated with the signal and data OFDM symbols. *See, e.g.*, Figures 17-1 and 17-4 of IEEE 802.11 2016. Each of the Accused Products, including the BCM6726 series, generates cyclic shifts that are added to the series of  $n$  time slots. *See, e.g.*, Sections 19.3.4 and 19.3.9.3.2 of IEEE 802.11 2016. Each time slot in the PDU frame comprises an effective symbol period, and a guard period is added at the start of each effective symbol period. *See, e.g.*, Table 19-6 and Figure 17-4 of IEEE 802.11 2016. Further, the length of the series of  $n$  time slots is less than the total length of the PDU frame. *See, e.g.*, Figure 17-4 of IEEE 802.11 2016.

142. The Accused Products, including the BCM6726 series, each comprise circuitry and/or components (hardware and/or software) for transmitting the generated frame as a radio signal. *See, e.g.*, Section 17.3.8.2 of IEEE 802.11 2016.

143. The specific ways in which the Accused Products, including the BCM6726 series, are configured to support the aforementioned features of IEEE 802.11n and/or IEEE 802.11ac

and/or IEEE 802.11ax and/or IEEE 802.11be are further detailed in confidential documents and/or source code that evidence infringement by the Accused Products as to at least Claim 1 of the '140 patent.

144. Furthermore, the Accused Products, including the BCM6726 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '140 patent.

145. The technology discussion above and the exemplary Accused Products provide context for Plaintiff's infringement allegations.

146. The claims of the '140 Patent are patent eligible under 35 U.S.C. § 101. The '140 patent is not directed to an ineligible abstract idea. For example, it is not a mathematical algorithm executed on a generic computer or a fundamental economic business practice. Instead, it is a technologically complex, particularized method of signal conversion and transmission. The '140 patent explains a problem that exists in cellular networks, namely that different cells transmitting in the same frequency will interfere with each other. *See, e.g.*, '140 patent, 1:30-32. That interference can be solved by having the different cells use different frequencies, but that solution causes another problem, i.e., decreased spectrum efficiency. *See, e.g.*, '140 patent, 1:30-44. Thus, '140 patent explains, "it is important to design a communication system such that the system has high resistance against interference thereby achieving an improvement in the spectrum efficiency". '140 patent, 1:45-47.

147. The '140 patent provides a technical solution to that technical problem by implementing "an improvement in a format of data that is modulated and transmitted using, for example, an OFDM (Orthogonal Frequency Division Multiplexing) technique." '140 patent, 1:14-17. The claims of the '140 patent provide for a specific format of transmission for that purpose.

For example, the “frame” in claim 1 includes a “a frame guard period added to the series of n time slots.” As the ’140 Patent explains, when “no frame guard is used, the interfering wave IFW interferes with two frames of the desired wave DSW. In contrast, in the communication system according to the present embodiment of the invention, a frame guard included in an OFDM signal prevents the interfering wave IFW from interfering with the second frame, as shown in FIGS. 15(A) and 15(B).” ’140 Patent, 18:63-19:2. This helps achieve the goal of the of the ’140 patent of “suppression of a frame loss due to interference caused by use of the same channel.” *Id.* at 3:32-33. Thus, the claimed transmission apparatus uses a transmission format designed to add efficiency to the transmission process in a particular manner. As such, the recited transmission apparatus is a concrete technical contribution and not simply the embodiment of an abstract idea.

148. At a minimum, Broadcom, Inc. and Broadcom Corporation have known of the ’140 patent at least as early as the filing date of the Complaint. In addition, Broadcom, Inc. and Broadcom Corporation have known about the ’140 patent since at least November 2021, when Broadcom, Inc. and Broadcom Corporation received notice of their infringement of the ’140 patent via a letter sent by Redwood on November 3, 2021. Redwood sent several follow-up letters to Broadcom, including letters sent on January 4, 2022 and March 2, 2022. In May 2022, Broadcom, Inc. and Broadcom Corporation received further notice of their infringement of the ’140 patent when Redwood sent a second letter providing notice of their infringement on May 12, 2022. Redwood again sent a follow-up letter to Broadcom, Inc. and Broadcom Corporation on September 13, 2022 and two follow-up letters to Broadcom, Inc. and Broadcom Corporation on September 14, 2022. On September 19, 2022, Broadcom, Inc. and Broadcom Corporation finally replied to Redwood via e-mail, where Redwood provided Broadcom, Inc. and Broadcom Corporation access to its data room for the infringement chart of the ’140 patent, where Broadcom, Inc. and Broadcom

Corporation were provided further notice of their infringement. Based on information and belief, Broadcom, Inc was on notice of the '140 patent from at least the foregoing dates that Broadcom Corporation was on notice of the '140 patent as a result of receiving actual or constructive notice from Broadcom Corporation, which is owned and controlled by its parent Broadcom, Inc.<sup>8</sup> Furthermore, Broadcom Corporation was on notice of the '140 patent from at least the foregoing dates that Broadcom, Inc. was on notice of the '140 patent as a result of receiving actual or constructive notice from Broadcom, Inc., which wholly owns and controls Broadcom Corporation, which is an agent and alter ego of Broadcom, Inc.<sup>9</sup>

149. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom has actively induced, under U.S.C. § 271(b), distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers to directly infringe one or more claims of the '140 patent by making, using, offering for sale, selling, and/or importing the Accused Products. Since at least the notice provided on the above-mentioned dates, Broadcom does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '140 patent. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution channels for the Accused Products into and within the United States, manufacturing the Accused Products in conformity with U.S. laws and regulations, manufacturing the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions

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<sup>8</sup> See FN 2, *supra*.

<sup>9</sup> See FN 2, *supra*.

or manuals for the Accused Products to purchasers and prospective buyers, providing the accused functionalities via hardware, software, and/or firmware that are included in the Accused Products to manufacturers, purchasers, sellers, distributors, and/or end users, testing and certifying features related to infringing features in the Accused Products, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

150. On information and belief, despite having knowledge of the '140 patent and their infringement, Defendants specifically intended for others to import and sell products accused of infringing the '140 patent. For example, Defendants specifically intended for its U.S.-based subsidiaries or customers to import and sell products accused of infringing the '140 patent. On information and belief, Defendants instructed and encouraged the importers to import and/or sell products accused of infringing the '140 patent. On information and belief, the purchase and sale agreements between Broadcom, Inc, Broadcom Corporation, and the importers provide such instruction and/or encouragement. Further, on information and belief, Defendants' U.S.-based subsidiaries, affiliates, employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the '140 patent in the United States.

151. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's contributory infringement pursuant to 35 U.S.C. § 271(c) includes offering to sell and/or license, selling and/or licensing, and/or providing within the United States, or importing into the United States, components of the patented invention of one or more claims of the '140 patent, constituting a material part of the invention. On information and belief, Broadcom knows and has known the same to be especially made or

especially adapted for use in an infringement of the '140 patent by making the Accused Products in conformity with the relevant IEEE 802.11 standards, and such components are not a staple article or commodity of commerce suitable for substantial noninfringing use. For example, Broadcom offers to sell, sells, and/or licenses or otherwise provides hardware and/or software/firmware components of the Accused Products within the United States; the components constitute a material part of the claimed inventions of the '140 patent that are especially made or especially adapted for use in end user products that infringe the '140 patent; and the components are not a staple article or commodity of commerce suitable for substantial noninfringing use.

152. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's infringement pursuant to 35 U.S.C. § 271(f)(1) includes supplying or causing to be supplied in or from the United States all or a substantial portion of the components of the patented invention of one or more claims of the '140 patent, where such components are uncombined in whole or in part, in such manner as to actively induce the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. For example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components of the Accused Products that comprise all or a substantial portion of the components of the patented inventions of the '140 patent, where Broadcom actively induces the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. In another example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components of the Accused Products that comprise all or a substantial portion of the components of the patented inventions of the '140 patent, where Broadcom actively induces



the combination of the hardware and/or software/firmware components with other components of an end user device outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution channels for the Accused Products into and within the United States, manufacturing the components of the Accused Products in conformity with U.S. laws and regulations, manufacturing the components of the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions or manuals or marketing materials regarding the combination of the hardware and software/firmware components, distributing or making available instructions or manuals or marketing materials regarding the combination of the hardware and/or software/firmware components with other components as part of making an end user device in part or in whole, testing and certifying features related to infringing features in the Accused Products, providing software and/or firmware for the Accused Products to manufacturers, purchasers, sellers, distributors, and/or end users, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

153. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's infringement pursuant to 35 U.S.C. § 271(f)(2) includes supplying or causing to be supplied in or from the United States components of the patented invention of one or more claims of the '140 patent that are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce

suitable for substantial noninfringing use, where such components are uncombined in whole or in part, knowing that such components are so made or adapted and intending that such components will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. For example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components that comprise all or a substantial portion of the components of the patented inventions of the '140 patent, where such components are uncombined in whole or in part, knowing that such components are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use and intending that such components will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. In another example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components that comprise all or a substantial portion of the components of the patented inventions of the '140 patent, where such components are uncombined in whole or in part with other components of an end user device, knowing that such components are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use and intending that such components will be combined with other components of an end user device outside of the United States in a manner that would infringe the patent if such combination occurred within the United States.

154. On information and belief, despite having knowledge of the '140 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '140 patent, Broadcom has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Broadcom's infringing activities relative to the '140 patent have been,

and continue to be, willful, wanton, malicious, in bad-faith, deliberate, consciously wrongful, flagrant, characteristic of a pirate, and an egregious case of misconduct beyond typical infringement such that Plaintiff is entitled under 35 U.S.C. § 284 to enhanced damages up to three times the amount found or assessed.

155. Redwood has been damaged as a result of Broadcom's infringing conduct described in this Count. Broadcom is, thus, liable to Redwood in an amount that adequately compensates Redwood for Broadcom's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT V**

(INFRINGEMENT OF U.S. PATENT NO. 9,374,209)

156. Plaintiff incorporates paragraphs 1 through 155 herein by reference.

157. Redwood is the assignee of the '209 patent, entitled "Transmission Signal Generation Apparatus, Transmission Signal Generation Method, Reception Signal Apparatus, and Reception Signal Method," with ownership of all substantial rights in the '209 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

158. The '209 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '209 patent issued from U.S. Patent Application No. 14/703,938.

159. Broadcom has and continues to directly and/or indirectly infringe one or more claims of the '209 patent in this judicial district and elsewhere in Texas and the United States.

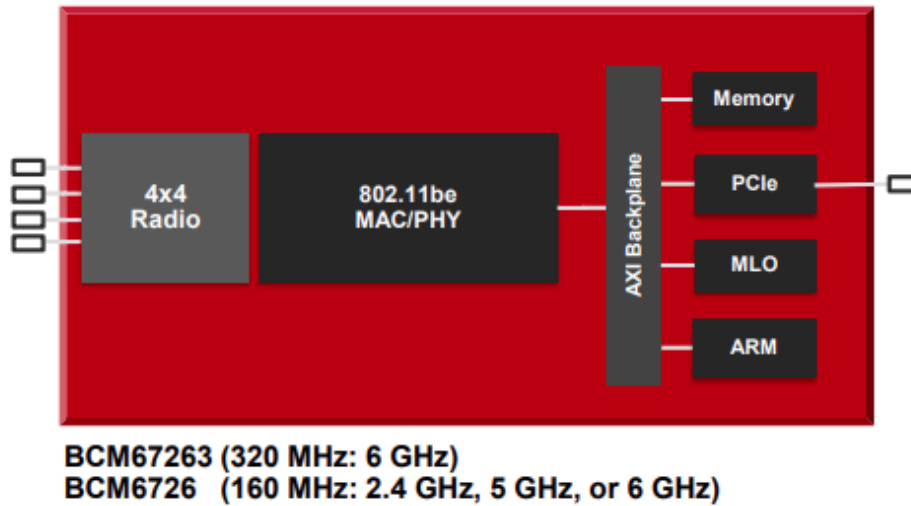
160. Broadcom directly infringes the '209 patent via 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the Accused Products, their components and

processes, and/or products containing the same that incorporate the fundamental technologies covered by the '209 patent.

161. Furthermore, Broadcom, Inc. directly infringes the '209 patent through its direct involvement in the activities of its subsidiaries, including Broadcom Corporation. Such subsidiaries conduct activities that constitute direct infringement of the '209 patent under 35 U.S.C. § 271(a) by making, using, testing, offering for sale, selling, and/or importing those Accused Products, their components and processes, and/or products containing the same that incorporated the fundamental technologies covered by the '209 patent. Further, Defendants are vicariously liable for this infringing conduct of its subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, Broadcom, Inc, Broadcom Corporation, and their subsidiaries and related companies are essentially the same company, and Broadcom Inc. and Broadcom Corporation have the right and ability to control their subsidiaries infringing acts and receive a direct financial benefit from the infringement of its subsidiaries. Furthermore, on information and belief, Broadcom sells and makes the Accused Products outside of the United States, delivers those products to manufacturers, customers, distributors, and/or subsidiaries in the United States, or in the case that it delivers the Accused Products outside of the United States it does so intending and/or knowing that those products or products that are manufactured to include Broadcom's Accused Products are destined for the United States and/or designing those products for inclusion in other products to be placed on sale and used in the United States, thereby directly infringing the '209 patent. *See, e.g., Lake Cherokee Hard Drive Techs., L.L.C. v. Marvell Semiconductor, Inc.*, 964 F. Supp. 2d 653, 658 (E.D. Tex. 2013).

162. For example, Broadcom infringes claim 1 of the '209 patent via the Accused Products, including the BCM6726 series. The Accused Products, including the BCM6726 series,

comprise a transmission signal generation apparatus configured to generate transmission signals (e.g., HT-mixed format transmission signals). *See, e.g.*, Figure 19-2 of IEEE 802.11 2016; *See, e.g.*, <https://www.broadcom.com/products/wireless/wireless-lan-infrastructure/bcm67263> (Broadcom advertising that the BCM6726 is MAC/PHY/radio device); <https://docs.broadcom.com/doc/6726X-PB1XX>:



BCM67263 & BCM6726 Specifications	
Parameter	Details
Wi-Fi Standards	IEEE 802.11be (Wi-Fi 7) Release 1.0 compliant IEEE 802.11ax (Wi-Fi 6 & 6E) compliant IEEE 802.11 a/b/g/n/ac
Spatial Streams	Quad-stream 4x4
Spectral Bands	2.4 GHz 5 GHz 6 GHz

163. The Accused Products, including the BCM6726 series, each comprise circuitry and/or components (hardware and/or software) configured to generate one or more transmission signals, where each transmission signal includes a data frame having preamble information, pilot information, and data information. *See, e.g.*, Sections 19.3.3 and 19.3.20 and Figure 19-2 of IEEE 802.11 2016. Further, each of the transmission signals include the PHY preamble, at least four pilot symbols, and data information. *See, e.g.*, Sections 19.3.1, 19.3.11.10, and 19.3.20 of IEEE 802.11 2016.

164. Each of the one or more transmission signals includes an associated preamble multiplied by a factor so that an average reception power of the associated preamble corresponds to an average reception power of the data information received with the associated preamble. For example, each of the transmission signals is multiplied by a normalization factor corresponding to the modulation scheme to achieve the same average power for all mappings, where the preamble and data information can have different modulation types and therefore different corresponding normalization factors. *See, e.g.*, Section 17.3.5.8, Table 17-11, Equation 17-20, and Figure 17.1 of IEEE 802.11 2016.

165. Each of the one or more transmission signals includes plural pilot symbol sequences. For example, each of the transmission signals include at least four pilot symbols inserted in, for example, carrier positions -21, -7, 7, and 21. *See, e.g.*, Section 19.3.11.10 and Figure 19-3 of IEEE 802.11 2016.

166. The Accused Products, including the BCM6726 series, each comprise circuitry and/or components (hardware and/or software) of an Inverse Fourier transformer configured to generate for each of the one or more transmission signals a corresponding OFDM signal for transmission by a corresponding one of one or more antennas by Inverse Fourier transforming each of the transmission signals. *See, e.g.*, Section 19.3.3 and Figure 19-3 of IEEE 802.11 2016.

167. The Inverse Fourier transformer of each of the Accused Products, including the BCM6726 series, is configured to arrange the pilot symbol sequences in corresponding pilot carriers during a first time period. For example, the Inverse Fourier transformer is configured to arrange pilot sequences in the pilot carriers of each OFDM symbol transmitted during a first time period (*e.g.*, the 3.2  $\mu$ s DFT period). *See, e.g.*, Section 19.3.6, 19.3.11.10, 19.3.21, 19.4.3, and Equation 19-90 of IEEE 802.11 2016.

168. The transmitter of each of the Accused Products, including the BCM6726 series, is configured to arrange sets of the pilot carriers in a same carrier position in the OFDM signal, where the plural pilot symbol sequences are all orthogonal to each other. For example, the transmitter is configured to arrange pilot sequences for each space-time stream, where each of the OFDM signals contains four pilot carriers inserted in, for example, carrier positions -21, -7, 7, and 21. *See, e.g.*, Section 19.3.11.10, Equation 19-54, and Table 19-19 of IEEE 802.11 2016. Pilot sequences corresponding to different spatial streams are orthogonal to each other. *See, e.g.*, Table 19-19 of IEEE 802.11 2016.

169. The specific ways in which the Accused Products, including the BCM6726 series, are configured to support the aforementioned features of IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax and/or IEEE 802.11be are further detailed in confidential documents and/or source code that evidence infringement by the Accused Products as to at least Claim 1 of the '209 patent.

170. Furthermore, the Accused Products, including the BCM6726 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '209 patent.

171. The technology discussion above and the exemplary Accused Products provide context for Plaintiff's infringement allegations.

172. The claims of the '209 patent are patent eligible under 35 U.S.C. § 101. The '209 patent is not directed to an ineligible abstract idea. For example, it is not a mathematical algorithm executed on a generic computer or a fundamental economic business practice. Instead, the '209 patent describes specific problems in signal transmission and communication involving multiple-input multiple-output (MIMO) OFDM communications and its claims are directed to specific ways

of solving those problems. '209 patent, 2:39-64. In summary, “sufficient consideration has not been given to the method of transmitting symbols for transmission path estimation and symbols for frequency offset estimation to realize high accuracy frequency offset estimation, high accuracy transmission path fluctuation estimation and high accuracy synchronization/signal detection” for MIMO-OFDM communications. *Id.* As the '209 patent explains, “the present invention relates to a technology for realizing an ideal symbol configuration for ... MIMO-OFDM communication” to provide high accuracy frequency offset estimation, high accuracy transmission path estimation, and high accuracy signal detection. '209 patent, 1:29-34. The '209 patent claims specific technical solutions that achieve the aforementioned improvements. *See, e.g.*, '209 patent, Claim 1.

173. Specifically, the '209 patent describes that “orthogonal sequences are assigned to corresponding subcarriers among OFDM signals transmitted at the same time from the respective antennas in the time domain to form pilot carriers, so that, even when pilot symbols are multiplexed among a plurality of channels (antennas), it is possible to estimate frequency offset/phase noise with high accuracy. Furthermore, since pilot symbols of each channel can be extracted without using a channel estimator value (transmission path fluctuation estimation value), it is possible to simplify the configuration of the section for compensating for the frequency offset/phase noise.” '209 patent, 3:9-19. These specific solutions are recited in claim 1 of the '209 patent. This allows MIMO OFDM systems and devices to estimate frequency offset and/or phase noise with high accuracy even when pilot symbols are multiplexed on different channels. '209 patent, 11:3-7. In the conventional solution, when the same carriers of channel A and channel B are not orthogonal to each other, the estimation accuracy for frequency offset and/or phase noise by frequency offset/phase noise estimation decreases (signals become components of interference with each other), and therefore it is not possible to realize high accuracy frequency offset/phase noise



compensation. '209 patent, 11:27-35. Furthermore, when a wireless LAN builds a system at the same frequency and in the same frequency band according to IEEE 802.11 and a spatial multiplexing MIMO system, this allows the frame configuration to be shared, and therefore it is possible to simplify the reception apparatus. '209 patent, 9:4-14. "Another important advantage is that since no channel estimation value (transmission path fluctuation estimation value) is required, it is possible to simplify the configuration of the part for compensating for the frequency offset and/or phase noise." '209 patent, 11:7-11. If pilot symbols of channel A and channel B are not orthogonal to each other, signal processing of MIMO demultiplexing is carried out, such that frequency offset and/or phase noise are then estimated. '209 patent, 11:11-17. On the other hand, when the claimed solution is utilized, it is possible to compensate for frequency offset and/or phase noise before demultiplexing a signal. '209 patent, 11:17-21. In addition, the claimed solution allows for the frequency offset and/or phase noise to be removed using pilot symbols even after demultiplexing the signal of channel A from the signal of channel B, thereby making it possible to compensate for the frequency offset and/or phase noise with higher accuracy. '209 patent, 11:21-26.

174. Thus, the '209 patent describes problems to be solved in MIMO OFDM digital signal communications as well as specific solutions for solving those problems that are reflected in the claims, including claim 1.

175. The claims of the '209 patent also survive step two of Alice because they recite an inventive concept that provides features that are more than well-understood, routine, conventional activity.

176. At a minimum, Broadcom, Inc. and Broadcom Corporation have known of the '209 patent at least as early as the filing date of the Complaint. In addition, Broadcom, Inc. and

Broadcom Corporation have known about the '209 patent since at least November 2021, when Broadcom, Inc. and Broadcom Corporation received notice of the '209 patent via a letter sent by Redwood on November 3, 2021. Redwood sent several follow-up letters to Broadcom, including letters sent on January 4, 2022 and March 2, 2022. In May 2022, Broadcom, Inc. and Broadcom Corporation received further notice of their infringement of the '209 patent when Redwood sent a second letter providing notice of their infringement on May 12, 2022. Redwood again sent a follow-up letter to Broadcom, Inc. and Broadcom Corporation on September 13, 2022 and two follow-up letters to Broadcom, Inc. and Broadcom Corporation on September 14, 2022. On September 19, 2022, Broadcom, Inc. and Broadcom Corporation finally replied to Redwood via e-mail, where Redwood provided Broadcom, Inc. and Broadcom Corporation access to its data room for the infringement chart of the '209 patent, where Broadcom, Inc. and Broadcom Corporation were provided further notice of their infringement. Based on information and belief, Broadcom, Inc was on notice of the '209 patent from at least the foregoing dates that Broadcom Corporation was on notice of the '209 patent as a result of receiving actual or constructive notice from Broadcom Corporation, which is owned and controlled by its parent Broadcom, Inc.<sup>10</sup> Furthermore, Broadcom Corporation was on notice of the '209 patent from at least the foregoing dates that Broadcom, Inc. was on notice of the '209 patent as a result of receiving actual or constructive notice from Broadcom, Inc., which wholly owns and controls Broadcom Corporation, which is an agent and alter ego of Broadcom, Inc.<sup>11</sup>

177. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom has actively induced, under U.S.C. § 271(b), distributors, customers, subsidiaries, importers, partners, affiliates, resellers,

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<sup>10</sup> See FN 2, *supra*.

<sup>11</sup> See FN 2, *supra*.

manufacturers, end users, and/or consumers to directly infringe one or more claims of the '209 patent by making, using, offering for sale, selling, and/or importing the Accused Products. Since at least the notice provided on the above-mentioned dates, Broadcom does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '209 patent. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution channels for the Accused Products into and within the United States, manufacturing the Accused Products in conformity with U.S. laws and regulations, manufacturing the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions or manuals for the Accused Products to purchasers and prospective buyers, providing the accused functionalities via hardware, software, and/or firmware that are included in the Accused Products to manufacturers, purchasers, sellers, distributors, and/or end users, testing and certifying features related to infringing features in the Accused Products, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

178. On information and belief, despite having knowledge of the '209 patent and their infringement, Defendants specifically intended for others to import and sell products accused of infringing the '209 patent. For example, Defendants specifically intended for its U.S.-based subsidiaries or customers to import and sell products accused of infringing the '209 patent. On information and belief, Defendants instructed and encouraged the importers to import and/or sell products accused of infringing the '209 patent. On information and belief, the purchase and sale

agreements between Broadcom, Inc., Broadcom Corporation, and the importers provide such instruction and/or encouragement. Further, on information and belief, Defendants' U.S.-based subsidiaries, affiliates, employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the '209 patent in the United States.

179. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's contributory infringement pursuant to 35 U.S.C. § 271(c) includes offering to sell and/or license, selling and/or licensing, and/or providing within the United States, or importing into the United States, components of the patented invention of one or more claims of the '209 patent, constituting a material part of the invention. On information and belief, Broadcom knows and has known the same to be especially made or especially adapted for use in an infringement of the '209 patent by making the Accused Products in conformity with the relevant IEEE 802.11 standards, and such components are not a staple article or commodity of commerce suitable for substantial noninfringing use. For example, Broadcom offers to sell, sells, and/or licenses or otherwise provides hardware and/or software/firmware components of the Accused Products within the United States; the components constitute a material part of the claimed inventions of the '209 patent that are especially made or especially adapted for use in end user products that infringe the '209 patent; and the components are not a staple article or commodity of commerce suitable for substantial noninfringing use.

180. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's infringement pursuant to 35 U.S.C. § 271(f)(1) includes supplying or causing to be supplied in or from the United States all or a substantial portion of the components of the patented invention of one or more claims of the '209

patent, where such components are uncombined in whole or in part, in such manner as to actively induce the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. For example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components of the Accused Products that comprise all or a substantial portion of the components of the patented inventions of the '209 patent, where Broadcom actively induces the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. In another example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components of the Accused Products that comprise all or a substantial portion of the components of the patented inventions of the '209 patent, where Broadcom actively induces the combination of the hardware and/or software/firmware components with other components of an end user device outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution channels for the Accused Products into and within the United States, manufacturing the components of the Accused Products in conformity with U.S. laws and regulations, manufacturing the components of the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions or manuals or marketing materials regarding the combination of the hardware and software/firmware components, distributing or making available instructions or manuals or

marketing materials regarding the combination of the hardware and/or software/firmware components with other components as part of making an end user device in part or in whole, testing and certifying features related to infringing features in the Accused Products, providing software and/or firmware for the Accused Products to manufacturers, purchasers, sellers, distributors, and/or end users, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

181. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's infringement pursuant to 35 U.S.C. § 271(f)(2) includes supplying or causing to be supplied in or from the United States components of the patented invention of one or more claims of the '209 patent that are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use, where such components are uncombined in whole or in part, knowing that such components are so made or adapted and intending that such components will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. For example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components that comprise all or a substantial portion of the components of the patented inventions of the '209 patent, where such components are uncombined in whole or in part, knowing that such components are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use and intending that such components will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. In another example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or

software/firmware components that comprise all or a substantial portion of the components of the patented inventions of the '209 patent, where such components are uncombined in whole or in part with other components of an end user device, knowing that such components are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use and intending that such components will be combined with other components of an end user device outside of the United States in a manner that would infringe the patent if such combination occurred within the United States.

182. On information and belief, despite having knowledge of the '209 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '209 patent, Broadcom has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Broadcom's infringing activities relative to the '209 patent have been, and continue to be, willful, wanton, malicious, in bad-faith, deliberate, consciously wrongful, flagrant, characteristic of a pirate, and an egregious case of misconduct beyond typical infringement such that Plaintiff is entitled under 35 U.S.C. § 284 to enhanced damages up to three times the amount found or assessed.

183. Redwood has been damaged as a result of Broadcom's infringing conduct described in this Count. Broadcom is, thus, liable to Redwood in an amount that adequately compensates Redwood for Broadcom's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

#### **COUNT VI**

(INFRINGEMENT OF U.S. PATENT NO. 10,270,574)

184. Plaintiff incorporates paragraphs 1 through 183 herein by reference.

185. Redwood is the assignee of the '574 patent, entitled "Transmission Signal Generation Apparatus, Transmission Signal Generation Method, Reception Signal Apparatus, and

Reception Signal Method,” with ownership of all substantial rights in the ’574 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

186. The ’574 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The ’574 patent issued from U.S. Patent Application No. 16/059,093.

187. Broadcom has and continues to directly and/or indirectly infringe one or more claims of the ’574 patent in this judicial district and elsewhere in Texas and the United States.

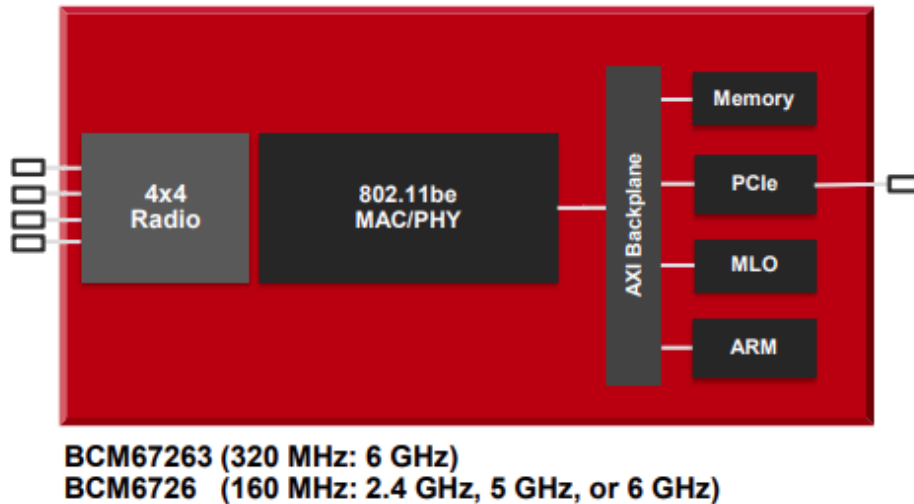
188. Broadcom directly infringes the ’574 patent via 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the ’574 patent.

189. Furthermore, Broadcom, Inc. directly infringes the ’574 patent through its direct involvement in the activities of its subsidiaries, including Broadcom Corporation. Such subsidiaries conduct activities that constitute direct infringement of the ’574 patent under 35 U.S.C. § 271(a) by making, using, testing, offering for sale, selling, and/or importing those Accused Products, their components and processes, and/or products containing the same that incorporated the fundamental technologies covered by the ’574 patent. Further, Defendants are vicariously liable for this infringing conduct of its subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, Broadcom, Inc, Broadcom Corporation, and their subsidiaries and related companies are essentially the same company, and Broadcom Inc. and Broadcom Corporation have the right and ability to control their subsidiaries infringing acts and receive a direct financial benefit from the infringement of its subsidiaries.



Furthermore, on information and belief, Broadcom sells and makes the Accused Products outside of the United States, delivers those products to manufacturers, customers, distributors, and/or subsidiaries in the United States, or in the case that it delivers the Accused Products outside of the United States it does so intending and/or knowing that those products or products that are manufactured to include Broadcom's Accused Products are destined for the United States and/or designing those products for inclusion in other products to be placed on sale and used in the United States, thereby directly infringing the '574 patent. *See, e.g., Lake Cherokee Hard Drive Techs., L.L.C. v. Marvell Semiconductor, Inc.*, 964 F. Supp. 2d 653, 658 (E.D. Tex. 2013).

190. For example, Broadcom infringes claim 1 of the '574 patent via the Accused Products, including the BCM6726 series. The Accused Products, including the BCM6726 series, are compliant with IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax and/or IEEE be and comprise a transmission apparatus that includes electronic circuitry compliant with the aforementioned IEEE standards. *See, e.g.,* Sections 17.3.8.2, 19.1.1, 19.3.3 and Figure 19-3 of IEEE 802.11 2016; *See, e.g.,* <https://www.broadcom.com/products/wireless/wireless-lan-infrastructure/bcm67263> (Broadcom advertising that the BCXM6726 is MAC/PHY/radio device); <https://docs.broadcom.com/doc/6726X-PB1XX>:



BCM67263 & BCM6726 Specifications	
Parameter	Details
Wi-Fi Standards	IEEE 802.11be (Wi-Fi 7) Release 1.0 compliant IEEE 802.11ax (Wi-Fi 6 & 6E) compliant IEEE 802.11 a/b/g/n/ac
Spatial Streams	Quad-stream 4x4
Spectral Bands	2.4 GHz 5 GHz 6 GHz

191. The Accused Products, including the BCM6726 series, comprise electronic circuitry configured to map a first stream of input data to first complex symbols in serial format. For example, the Accused Products comprise a constellation mapper to map a sequence of bits to a series of complex numbers. *See, e.g.*, Section 17.3.2.2 of IEEE 802.11 2016.

192. The Accused Products, including the BCM6726 series, comprise electronic circuitry configured to convert the first complex symbols in serial format into first complex symbols in parallel format. For example, the Accused Products are configured to insert the complex numbers into subcarriers associated with one OFDM symbol, such that the information in each subcarrier is transmitted in parallel as part of the full OFDM symbol. *See, e.g.*, Section 17.3.2.2 of IEEE 802.11 2016. For example, a complex value  $-0.316 + 0.316j$  is inserted in subcarrier 26 to form OFDM symbols in the frequency domain. *See, e.g.*, Section I.1.6.3 and Table I-20 of IEEE 802.11 2016.

193. The Accused Products, including the BCM6726 series, comprise electronic circuitry configured to perform an inverse Fourier transform on the first complex symbols in parallel format to form first Orthogonal Frequency Division Multiplexed (OFDM) signals associated with multiple subcarriers. For example, the Accused Products comprise inverse discrete fourier transform sections configured to convert the plurality of symbols to OFDM time domain blocks for transmission. *See, e.g.*, Section 17.3.2.2 of IEEE 802.11 2016.

194. The Accused Products, including the BCM6726 series, comprise electronic circuitry configured to transmit the first OFDM signals over the multiple subcarriers in a same frequency band over a same time period that includes a same set of time slots. For example, the Accused Products are configured to transmit signals comprising OFDM symbols, where each OFDM symbol is a time slot and transmissions occur within a same time period indicated by the TXTIME parameter over a channel having the same frequency band (e.g., 20 MHz). *See, e.g.*, Sections 17.3.2.2, 19.3.15.1, 19.3.221, Figure 17.1, and Equation 19-90 of IEEE 802.11 2016.

195. The Accused Products, including the BCM6726 series, comprise electronic circuitry configured to transmit first pilot information on a first one of a plurality of pilot subcarriers during the same set of time slots. For example, the Accused Products are configured to transmit a first pilot value of 1 placed on a first pilot subcarrier within an OFDM symbol during the same set of time slots. *See, e.g.*, Sections 17.3.5.9 and Table 19-19 of IEEE 802.11 2016.

196. The Accused Products, including the BCM6726 series, comprise electronic circuitry configured to transmit second pilot information on a second one of a plurality of pilot subcarriers during the same set of time slots, the second pilot information being different from the first pilot information. For example, the Accused Products are configured to transmit a second pilot value of -1 placed on a second pilot subcarrier within an OFDM symbol that will be

transmitted during the same set of time slots. *See, e.g.*, Sections 17.3.5.9 and Table 19-19 of IEEE 802.11 2016.

197. The Accused Products, including the BCM6726 series, comprise electronic circuitry configured to map a second stream of input data to second complex symbols in serial format. For example, the Accused Products comprise a constellation mapper to map a sequence of bits to a series of constellation points. *See, e.g.*, Section 17.3.2.2 of IEEE 802.11 2016.

198. The Accused Products, including the BCM6726 series, comprise electronic circuitry configured to convert the second complex symbols in serial format into second complex symbols in parallel format. For example, the Accused Products are configured to insert the complex numbers into subcarriers associated with one OFDM symbol, such that the information in each subcarrier is transmitted in parallel as part of the full OFDM symbol. *See, e.g.*, Section 17.3.2.2 of IEEE 802.11 2016. For example, a complex value  $-0.316 + 0.316j$  is inserted in subcarrier 26 to form OFDM symbols in the frequency domain. *See, e.g.*, Section I.1.6.3 and Table I-20 of IEEE 802.11 2016.

199. The Accused Products, including the BCM6726 series, comprise electronic circuitry configured to perform an inverse Fourier transform on the second complex symbols in parallel format to form second OFDM signals associated with the multiple subcarriers. For example, the Accused Products comprise inverse discrete fourier transform sections configured to convert the plurality of symbols to OFDM time domain blocks for transmission. *See, e.g.*, Section 17.3.2.2 of IEEE 802.11 2016.

200. The Accused Products, including the BCM6726 series, comprise electronic circuitry configured to transmit the second OFDM signals over the multiple subcarriers in the same frequency band over the same time period that includes the same set of time slots. For example,

the Accused Products are configured to transmit signals comprising OFDM symbols, where each OFDM symbol is a time slot and transmissions occur within a same time period indicated by the `TXTIME` parameter over a channel having the same frequency band (e.g., 20 MHz). *See, e.g.*, Sections 17.3.2.2, 19.3.15.1, 19.3.221, Figure 17.1, and Equation 19-90 of IEEE 802.11 2016.

201. The Accused Products, including the BCM6726 series, comprise electronic circuitry configured to transmit the first pilot information on the second pilot subcarrier during the same set of time slots. For example, the Accused Products are configured to transmit a first pilot value of 1 placed on a second pilot subcarrier within an OFDM symbol during the same set of time slots. *See, e.g.*, Sections 17.3.5.9 and Table 19-19 of IEEE 802.11 2016.

202. The Accused Products, including the BCM6726 series, comprise electronic circuitry configured to transmit the second pilot information on one of the plurality of pilot subcarriers during the same set of time slots. For example, the Accused Products are configured to transmit a second pilot value of -1 placed on a pilot subcarrier within an OFDM symbol that will be transmitted during the same set of time slots. *See, e.g.*, Sections 17.3.5.9 and Table 19-19 of IEEE 802.11 2016.

203. The specific ways in which the Accused Products, including the BCM6726 series, are configured to support the aforementioned features of IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax and/or IEEE 802.11be are further detailed in confidential documents and/or source code that evidence infringement by the Accused Products as to at least Claim 1 of the '574 patent.

204. Furthermore, the Accused Products, including the BCM6726 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '574 patent.

205. The technology discussion above and the exemplary Accused Products provide context for Plaintiff's infringement allegations.

206. The claims of the '574 patent are patent eligible under 35 U.S.C. § 101. The '574 patent is not directed to an ineligible abstract idea. For example, it is not a mathematical algorithm executed on a generic computer or a fundamental economic business practice. Instead, the '574 patent describes specific problems in signal transmission and communication involving multiple-input multiple-output (MIMO) OFDM communications and its claims are directed to specific ways of solving those problems. '574 patent, 2:50-3:9. In summary, "sufficient consideration has not been given to the method of transmitting symbols for transmission path estimation and symbols for frequency offset estimation to realize high accuracy frequency offset estimation, high accuracy transmission path fluctuation estimation and high accuracy synchronization/signal detection" for MIMO-OFDM communications. *Id.* As the '574 patent explains, "the present invention relates to a technology for realizing an ideal symbol configuration for ... MIMO-OFDM communication" to provide high accuracy frequency offset estimation, high accuracy transmission path estimation, and high accuracy signal detection. '574 patent, 1:39-44. The '574 patent claims specific technical solutions that achieve the aforementioned improvements. *See, e.g.*, '574 patent, Claims 1-2.

207. Specifically, the '574 patent describes that "orthogonal sequences are assigned to corresponding subcarriers among OFDM signals transmitted at the same time from the respective antennas in the time domain to form pilot carriers, so that, even when pilot symbols are multiplexed among a plurality of channels (antennas), it is possible to estimate frequency offset/phase noise with high accuracy. Furthermore, since pilot symbols of each channel can be extracted without using a channel estimator value (transmission path fluctuation estimation value), it is possible to simplify the configuration of the section for compensating for the frequency offset/phase noise."

'574 patent, 3:21-32. These specific solutions are recited in claims 1-2 of the '574 patent. This allows MIMO OFDM systems and devices to estimate frequency offset and/or phase noise with high accuracy even when pilot symbols are multiplexed on different channels. '574 patent, 11:27-31. In the conventional solution, when the same carriers of channel A and channel B are not orthogonal to each other, the estimation accuracy for frequency offset and/or phase noise by frequency offset/phase noise estimation decreases (signals become components of interference with each other), and therefore it is not possible to realize high accuracy frequency offset/phase noise compensation. '574 patent, 11:52-61. Furthermore, when a wireless LAN builds a system at the same frequency and in the same frequency band according to IEEE 802.11 and a spatial multiplexing MIMO system, this allows the frame configuration to be shared, and therefore it is possible to simplify the reception apparatus. '574 patent, 9:24-24. "Another important advantage is that since no channel estimation value (transmission path fluctuation estimation value) is required, it is possible to simplify the configuration of the part for compensating for the frequency offset and/or phase noise." '574 patent, 11:32-36. If pilot symbols of channel A and channel B are not orthogonal to each other, signal processing of MIMO demultiplexing is carried out, such that frequency offset and/or phase noise are then estimated. '574 patent, 11:36-42. On the other hand, when the claimed solutions are utilized, it is possible to compensate for frequency offset and/or phase noise before demultiplexing a signal. '574 patent, 11:42-45. In addition, the claimed solutions allow for the frequency offset and/or phase noise to be removed using pilot symbols even after demultiplexing the signal of channel A from the signal of channel B, thereby making it possible to compensate for the frequency offset and/or phase noise with higher accuracy. '574 patent, 11:46-51.

208. Furthermore, the '574 patent discloses additional improvements to symbol configurations for MIMO OFDM communications. Claim 1 of the '574 patent recites that “the second pilot information being different from the first pilot information” as to the OFDM transmissions from each of the first and second antennas during the same time period that includes the same set of time slots in the same frequency band. According to this improved configuration, when MIMO OFDM transmissions are carried out using more than one antenna, it minimizes an increase of transmission peak without degrading estimation accuracy for frequency offset/phase noise. '574 patent, 3:43-47, 10:34-40.

209. Thus, the '574 patent describes problems to be solved in MIMO OFDM digital signal communications as well as specific solutions for solving those problems that are reflected in the claims, including claims 1 and 2.

210. The claims also survive step two of Alice because they recite an inventive concept that provides features that are more than well-understood, routine, conventional activity.

211. At a minimum, Broadcom, Inc. and Broadcom Corporation have known of the '574 patent at least as early as the filing date of the Complaint. In addition, Broadcom, Inc. and Broadcom Corporation have known about the '574 patent since at least November 2021, when Broadcom, Inc. and Broadcom Corporation received notice of the '574 patent via a letter sent by Redwood on November 3, 2021. Redwood sent several follow-up letters to Broadcom, including letters sent on January 4, 2022 and March 2, 2022. In May 2022, Broadcom, Inc. and Broadcom Corporation received further notice of their infringement of the '574 patent when Redwood sent a second letter providing notice of their infringement on May 12, 2022. Redwood again sent a follow-up letter to Broadcom, Inc. and Broadcom Corporation on September 13, 2022 and two follow-up letters to Broadcom, Inc. and Broadcom Corporation on September 14, 2022. On



September 19, 2022, Broadcom, Inc. and Broadcom Corporation finally replied to Redwood via e-mail, where Redwood provided Broadcom, Inc. and Broadcom Corporation access to its data room for the infringement chart of the '574 patent, where Broadcom, Inc. and Broadcom Corporation were provided further notice of their infringement. Based on information and belief, Broadcom, Inc was on notice of the '574 patent from at least the foregoing dates that Broadcom Corporation was on notice of the '574 patent as a result of receiving actual or constructive notice from Broadcom Corporation, which is owned and controlled by its parent Broadcom, Inc.<sup>12</sup> Furthermore, Broadcom Corporation was on notice of the '574 patent from at least the foregoing dates that Broadcom, Inc. was on notice of the '574 patent as a result of receiving actual or constructive notice from Broadcom, Inc., which wholly owns and controls Broadcom Corporation, which is an agent and alter ego of Broadcom, Inc.<sup>13</sup>

212. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom has actively induced, under U.S.C. § 271(b), distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers to directly infringe one or more claims of the '574 patent by making, using, offering for sale, selling, and/or importing the Accused Products. Since at least the notice provided on the above-mentioned dates, Broadcom does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '574 patent. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution

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<sup>12</sup> See FN 2, *supra*.

<sup>13</sup> See FN 2, *supra*.

channels for the Accused Products into and within the United States, manufacturing the Accused Products in conformity with U.S. laws and regulations, manufacturing the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions or manuals for the Accused Products to purchasers and prospective buyers, providing the accused functionalities via hardware, software, and/or firmware that are included in the Accused Products to manufacturers, purchasers, sellers, distributors, and/or end users, testing and certifying features related to infringing features in the Accused Products, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

213. On information and belief, despite having knowledge of the '574 patent and their infringement, Defendants specifically intended for others to import and sell products accused of infringing the '574 patent. For example, Defendants specifically intended for its U.S.-based subsidiaries or customers to import and sell products accused of infringing the '574 patent. On information and belief, Defendants instructed and encouraged the importers to import and/or sell products accused of infringing the '574 patent. On information and belief, the purchase and sale agreements between Broadcom, Inc., Broadcom Corporation, and the importers provide such instruction and/or encouragement. Further, on information and belief, Defendants' U.S.-based subsidiaries, affiliates, employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the '574 patent in the United States.

214. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's contributory infringement pursuant to 35 U.S.C. § 271(c) includes offering to sell and/or license, selling and/or licensing, and/or

providing within the United States, or importing into the United States, components of the patented invention of one or more claims of the '574 patent, constituting a material part of the invention. On information and belief, Broadcom knows and has known the same to be especially made or especially adapted for use in an infringement of the '574 patent by making the Accused Products in conformity with the relevant IEEE 802.11 standards, and such components are not a staple article or commodity of commerce suitable for substantial noninfringing use. For example, Broadcom offers to sell, sells, and/or licenses or otherwise provides hardware and/or software/firmware components of the Accused Products within the United States; the components constitute a material part of the claimed inventions of the '574 patent that are especially made or especially adapted for use in end user products that infringe the '574 patent; and the components are not a staple article or commodity of commerce suitable for substantial noninfringing use.

215. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's infringement pursuant to 35 U.S.C. § 271(f)(1) includes supplying or causing to be supplied in or from the United States all or a substantial portion of the components of the patented invention of one or more claims of the '574 patent, where such components are uncombined in whole or in part, in such manner as to actively induce the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. For example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components of the Accused Products that comprise all or a substantial portion of the components of the patented inventions of the '574 patent, where Broadcom actively induces the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. In another example, Broadcom

supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components of the Accused Products that comprise all or a substantial portion of the components of the patented inventions of the '574 patent, where Broadcom actively induces the combination of the hardware and/or software/firmware components with other components of an end user device outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution channels for the Accused Products into and within the United States, manufacturing the components of the Accused Products in conformity with U.S. laws and regulations, manufacturing the components of the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions or manuals or marketing materials regarding the combination of the hardware and software/firmware components, distributing or making available instructions or manuals or marketing materials regarding the combination of the hardware and/or software/firmware components with other components as part of making an end user device in part or in whole, testing and certifying features related to infringing features in the Accused Products, providing software and/or firmware for the Accused Products to manufacturers, purchasers, sellers, distributors, and/or end users, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

216. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's infringement pursuant to 35 U.S.C. §

271(f)(2) includes supplying or causing to be supplied in or from the United States components of the patented invention of one or more claims of the '574 patent that are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use, where such components are uncombined in whole or in part, knowing that such components are so made or adapted and intending that such components will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. For example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components that comprise all or a substantial portion of the components of the patented inventions of the '574 patent, where such components are uncombined in whole or in part, knowing that such components are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use and intending that such components will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. In another example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components that comprise all or a substantial portion of the components of the patented inventions of the '574 patent, where such components are uncombined in whole or in part with other components of an end user device, knowing that such components are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use and intending that such components will be combined with other components of an end user device outside of the United States in a manner that would infringe the patent if such combination occurred within the United States.

217. On information and belief, despite having knowledge of the '574 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '574 patent, Broadcom has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Broadcom's infringing activities relative to the '574 patent have been, and continue to be, willful, wanton, malicious, in bad-faith, deliberate, consciously wrongful, flagrant, characteristic of a pirate, and an egregious case of misconduct beyond typical infringement such that Plaintiff is entitled under 35 U.S.C. § 284 to enhanced damages up to three times the amount found or assessed.

218. Redwood has been damaged as a result of Broadcom's infringing conduct described in this Count. Broadcom is, thus, liable to Redwood in an amount that adequately compensates Redwood for Broadcom's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

## **COUNT VII**

(INFRINGEMENT OF U.S. PATENT NO. 7,701,920)

219. Plaintiff incorporates paragraphs 1 through 218 herein by reference.

220. Redwood is the assignee of the '920 patent, entitled "Communication System, a Communication Method, and a Communication Apparatus for Carrying Out Data Communication Among a Plurality of Communication Stations" with ownership of all substantial rights in the '920 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

221. The '920 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '920 patent issued from U.S. Patent Application No. 10/821,884.

222. Broadcom has and continues to directly and/or indirectly infringe one or more claims of the '920 patent in this judicial district and elsewhere in Texas and the United States.

223. Broadcom directly infringes the '920 patent via 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '920 patent.

224. Furthermore, Broadcom, Inc. directly infringes the '920 patent through its direct involvement in the activities of its subsidiaries, including Broadcom Corporation. Such subsidiaries conduct activities that constitute direct infringement of the '920 patent under 35 U.S.C. § 271(a) by making, using, testing, offering for sale, selling, and/or importing those Accused Products, their components and processes, and/or products containing the same that incorporated the fundamental technologies covered by the '920 patent. Further, Defendants are vicariously liable for this infringing conduct of its subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, Broadcom, Inc, Broadcom Corporation, and their subsidiaries and related companies are essentially the same company, and Broadcom Inc. and Broadcom Corporation have the right and ability to control their subsidiaries infringing acts and receive a direct financial benefit from the infringement of its subsidiaries. Furthermore, on information and belief, Broadcom sells and makes the Accused Products outside of the United States, delivers those products to manufacturers, customers, distributors, and/or subsidiaries in the United States, or in the case that it delivers the Accused Products outside of the United States it does so intending and/or knowing that those products or products that are manufactured to include Broadcom's Accused Products are destined for the United States and/or designing those products for inclusion in other products to be placed on sale and used in the United

States, thereby directly infringing the '920 patent. *See, e.g., Lake Cherokee Hard Drive Techs., L.L.C. v. Marvell Semiconductor, Inc.*, 964 F. Supp. 2d 653, 658 (E.D. Tex. 2013).

225. For example, Broadcom infringes claim 13 of the '920 patent via the Accused Products, including the Broadcom chipset that comprises a BCM20130 baseband SoC and a BCM20138 RF transceiver chip, collectively ("Broadcom Chipset"). The Accused Products, including the Broadcom Chipset, each are compliant with IEEE 802.11ad and/or IEEE 802.11ay, and each comprise a communication apparatus for transmitting data to other communication stations. *See, e.g.,* <https://www.broadcom.com/news/press-releases/broadcom-announces-industrys-first-60-ghz-wireless-mesh-solution> (Broadcom announces the industry's first 60 GHz wireless mesh chipset solution consisting of "a BCM20130 baseband SoC and a BCM20138 RF transceiver chip." The Broadcom Chipset communicates a "traffic stream of IEEE 802.11ad data transferring up to 4.62 Gbps between two transceivers.")

226. Each of the Accused Products, including the Broadcom Chipset, comprise data processing means for generating a request to send signal indicating a request to initiate data transmission, the request to send signal including an address of a second communication station that is intended to receive the data transmission. IEEE 802.11-2016 specifies distributed coordination functions (DCF) for DMG wireless stations. *See, e.g.,* Section 10.3.1 of IEEE 802.11 2016. For example, the Accused Products, including the Broadcom Chipset, are configured to generate a request to send (RTS) signal indicating a request to initiate data transmission, such that the RTS signal indicates the impending use of the medium to transmit a Data frame to a second communication station and the RTS signal includes a receiver address (RA), which is the address of the second communication station that is intended to receive the data transmission. *See, e.g.,* Sections 9.3.1.2, 10.3.1, and Figure 9-20 of IEEE 802.11 2016.



227. The Accused Products, including the Broadcom Chipset, each comprise communication means for transmitting the request to send signal, and receiving a clear to send signal from said second communication station, in reply to the request to send signal. For example, the Accused Products, including the Broadcom Chipset, include a transceiver and/or antenna for transmitting the RTS signal for transmitting the RTS signal and receiving a DMG clear to send (CTS) signal from the second communication in reply to the RTS signal. *See, e.g.*, Sections 10.3.1 and 10.3.2.7 of IEEE 802.11 2016. The clear to send signal includes at least a first section and a second section, the first section including information used to indicate an interval of time during which a third communication station having an address that is not included in the second section must stop its communication operation, and the second section including the address of said first communication station, said second communication station transmits said clear to send signal. For example, the CTS signal transmitted by the second communication station includes a frame with a series of sections, including a first section having duration information specifying the amount of time the network allocates to the communication apparatus for transmission, such that a third communication station must stop its communication operation during this specified amount of time. *See, e.g.*, Section 9.3.1.14 and Figure 9-43 of IEEE 802.11 2016. For example, the CTS signal transmitted by the second communication station includes a frame with a series of sections, including a second section having the address (*e.g.*, the receiver address “RA”) of the first communication station. *See, e.g.*, Section 9.3.1.14 and Figure 9-43 of IEEE 802.11 2016.

228. The specific ways in which the Accused Products, including the Broadcom Chipset, are configured to support the aforementioned features of IEEE 802.11ad and/or IEEE 802.11ay are further detailed in confidential documents and/or source code that evidence infringement by the Accused Products as to Claim 13 of the '920 patent.

229. Furthermore, the Accused Products, including the Broadcom Chipset, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 13 of the '920 patent.

230. The technology discussion above and the exemplary Accused Products provide context for Plaintiff's infringement allegations.

231. The claims of the '920 patent are patent eligible under 35 U.S.C. § 101. The '920 patent is not directed to an ineligible abstract idea. For example, it is not a mathematical algorithm executed on a generic computer or a fundamental economic business practice. Instead, it offers, for example, a technologically complex invention that "provides a communication system in which new frame formats for the RTS (Request To Send) signal, the CTS (Clear To Send) signal and the ACK (Acknowledge) signal are proposed, and the access point transmits the RTS signal describing at least addresses of a plurality of stations requested to receive data and receives a plurality of CTS signals transmitted from a plurality of stations, so that the space division multiplexing communication can be provided between the access point with the adaptive array antenna and a plurality of stations with the coexistent with the station operating according to the conventional protocol." '920 patent, 6:22-33. That solution is reflected in claims of the '920 patent, which include, for example, specific limitations relating to a request to send signal and the clear to send signal. *See, e.g.*, claim 13, all limitations.

232. Furthermore, the patent explains that the claimed format of the CTS signal includes an additional field for an address of the communication station transmitting the CTS that was lacking in the conventional CTS signal. '920 patent, 10:65-11:3. The claims recite detailed implementations directed to inventive concepts such as improving communication systems, apparatuses, and transmissions in the context of RTS/CTS signaling protocols.

233. Thus, the '920 patent describes problems to be solved in digital signal communications as well as specific solutions for solving those problems that are reflected in the claims, including claim 13.

234. The claims of the '920 patent also survive step two of Alice because they recite an inventive concept that provides features that are more than well-understood, routine, conventional activity. For example, the patent explains that the claimed format of the CTS signal includes an additional field for an address of the communication station transmitting the CTS that was lacking in the conventional CTS signal. '920 patent, 10:65-11:3.

235. At a minimum, Broadcom, Inc. and Broadcom Corporation have known of the '920 patent at least as early as the filing date of the Complaint. In addition, Broadcom, Inc. and Broadcom Corporation have known about the '920 patent since at least November 2021, when Broadcom, Inc. and Broadcom Corporation received notice of their infringement of the '920 patent via a letter sent by Redwood on November 3, 2021. Redwood sent several follow-up letters to Broadcom, including letters sent on January 4, 2022 and March 2, 2022. In May 2022, Broadcom, Inc. and Broadcom Corporation received further notice of their infringement of the '920 patent when Redwood sent a second letter providing additional notice of their infringement on May 12, 2022. Redwood again sent a follow-up letter to Broadcom, Inc. and Broadcom Corporation on September 13, 2022 and two follow-up letters to Broadcom, Inc. and Broadcom Corporation on September 14, 2022. On September 19, 2022, Broadcom, Inc. and Broadcom Corporation finally replied to Redwood via e-mail, where Redwood provided Broadcom, Inc. and Broadcom Corporation access to its data room for the infringement chart of the '920 patent, where Broadcom, Inc. and Broadcom Corporation were provided further notice of their infringement. Based on information and belief, Broadcom, Inc was on notice of the '920 patent from at least the foregoing

dates that Broadcom Corporation was on notice of the '920 patent as a result of receiving actual or constructive notice from Broadcom Corporation, which is owned and controlled by its parent Broadcom, Inc.<sup>14</sup> Furthermore, Broadcom Corporation was on notice of the '920 patent from at least the foregoing dates that Broadcom, Inc. was on notice of the '920 patent as a result of receiving actual or constructive notice from Broadcom, Inc., which wholly owns and controls Broadcom Corporation, which is an agent and alter ego of Broadcom, Inc.<sup>15</sup>

236. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom has actively induced, under U.S.C. § 271(b), distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers to directly infringe one or more claims of the '920 patent by making, using, offering for sale, selling, and/or importing the Accused Products. Since at least the notice provided on the above-mentioned dates, Broadcom does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '920 patent. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, end users, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution channels for the Accused Products into and within the United States, manufacturing the Accused Products in conformity with U.S. laws and regulations, manufacturing the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions or manuals for the Accused Products to purchasers and prospective buyers, providing the accused functionalities via hardware, software, and/or firmware that are included in the Accused Products

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<sup>14</sup> See FN 2, *supra*.

<sup>15</sup> See FN 2, *supra*.

to manufacturers, purchasers, sellers, distributors, and/or end users, testing and certifying features related to infringing features in the Accused Products, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

237. On information and belief, despite having knowledge of the '920 patent and their infringement, Defendants specifically intended for others to import and sell products accused of infringing the '920 patent. For example, Defendants specifically intended for its U.S.-based subsidiaries or customers to import and sell products accused of infringing the '920 patent. On information and belief, Defendants instructed and encouraged the importers to import and/or sell products accused of infringing the '920 patent. On information and belief, the purchase and sale agreements between Broadcom, Inc., Broadcom Corporation, and the importers provide such instruction and/or encouragement. Further, on information and belief, Defendants' U.S.-based subsidiaries, affiliates, employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the '920 patent in the United States.

238. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's contributory infringement pursuant to 35 U.S.C. § 271(c) includes offering to sell and/or license, selling and/or licensing, and/or providing within the United States, or importing into the United States, components of the patented invention of one or more claims of the '920 patent, constituting a material part of the invention. On information and belief, Broadcom knows and has known the same to be especially made or especially adapted for use in an infringement of the '920 patent by making the Accused Products in conformity with the relevant IEEE 802.11 standards, and such components are not a staple

article or commodity of commerce suitable for substantial noninfringing use. For example, Broadcom offers to sell, sells, and/or licenses or otherwise provides hardware and/or software/firmware components of the Accused Products within the United States; the components constitute a material part of the claimed inventions of the '920 patent that are especially made or especially adapted for use in end user products that infringe the '920 patent; and the components are not a staple article or commodity of commerce suitable for substantial noninfringing use.

239. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's infringement pursuant to 35 U.S.C. § 271(f)(1) includes supplying or causing to be supplied in or from the United States all or a substantial portion of the components of the patented invention of one or more claims of the '920 patent, where such components are uncombined in whole or in part, in such manner as to actively induce the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. For example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components of the Accused Products that comprise all or a substantial portion of the components of the patented inventions of the '920 patent, where Broadcom actively induces the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. In another example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components of the Accused Products that comprise all or a substantial portion of the components of the patented inventions of the '920 patent, where Broadcom actively induces the combination of the hardware and/or software/firmware components with other components of an end user device outside of the United States in a manner that would infringe the patent if such

combination occurred within the United States. Broadcom intends to cause, and has taken affirmative steps to induce infringement by distributors, customers, subsidiaries, importers, partners, affiliates, resellers, manufacturers, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining and/or knowledge of established distribution channels for the Accused Products into and within the United States, manufacturing the components of the Accused Products in conformity with U.S. laws and regulations, manufacturing the components of the Accused Products in conformity with the relevant IEEE 802.11 standards, distributing or making available instructions or manuals or marketing materials regarding the combination of the hardware and software/firmware components, distributing or making available instructions or manuals or marketing materials regarding the combination of the hardware and/or software/firmware components with other components as part of making an end user device in part or in whole, testing and certifying features related to infringing features in the Accused Products, providing software and/or firmware for the Accused Products to manufacturers, purchasers, sellers, distributors, and/or end users, and/or providing technical support, replacement parts, or services for these products to these purchasers and/or sellers in the United States.

240. On information and belief, since at least the above-mentioned dates when Broadcom was on notice of its infringement, Broadcom's infringement pursuant to 35 U.S.C. § 271(f)(2) includes supplying or causing to be supplied in or from the United States components of the patented invention of one or more claims of the '920 patent that are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use, where such components are uncombined in whole or in part, knowing that such components are so made or adapted and intending that such components

will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. For example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components that comprise all or a substantial portion of the components of the patented inventions of the '920 patent, where such components are uncombined in whole or in part, knowing that such components are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use and intending that such components will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States. In another example, Broadcom supplies or causes to be supplied in or from the United States the hardware and/or software/firmware components that comprise all or a substantial portion of the components of the patented inventions of the '920 patent, where such components are uncombined in whole or in part with other components of an end user device, knowing that such components are especially made or especially adapted for use in the invention and not staple articles or commodities of commerce suitable for substantial noninfringing use and intending that such components will be combined with other components of an end user device outside of the United States in a manner that would infringe the patent if such combination occurred within the United States.

241. On information and belief, despite having knowledge of the '920 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '920 patent, Broadcom has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Broadcom's infringing activities relative to the '920 patent have been, and continue to be, willful, wanton, malicious, in bad-faith, deliberate, consciously wrongful, flagrant, characteristic of a pirate, and an egregious case of misconduct beyond typical



infringement such that Plaintiff is entitled under 35 U.S.C. § 284 to enhanced damages up to three times the amount found or assessed.

242. Redwood has been damaged as a result of Broadcom's infringing conduct described in this Court. Broadcom is, thus, liable to Redwood in an amount that adequately compensates Redwood for Broadcom's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

### **CONCLUSION**

243. Plaintiff Redwood is entitled to recover from Broadcom the damages sustained by Plaintiff as a result of Broadcom's wrongful acts, and willful infringement, in an amount subject to proof at trial, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court.

244. Plaintiff has incurred and will incur attorneys' fees, costs, and expenses in the prosecution of this action. The circumstances of this dispute may give rise to an exceptional case within the meaning of 35 U.S.C. § 285, and Plaintiff is entitled to recover its reasonable and necessary attorneys' fees, costs, and expenses.

### **JURY DEMAND**

245. Plaintiff hereby requests a trial by jury pursuant to Rule 38 of the Federal Rules of Civil Procedure.

### **PRAYER FOR RELIEF**

246. Plaintiff respectfully requests that the Court find in its favor and against Broadcom, and that the Court grant Plaintiff the following relief:

1. A judgment that Broadcom has infringed the Asserted Patents as alleged herein, directly and/or indirectly;

2. A judgment for an accounting of all damages sustained by Plaintiff as a result of the acts of infringement by Broadcom;
3. A judgment and order requiring Broadcom to pay Plaintiff damages under 35 U.S.C. § 284, including up to treble damages as provided by 35 U.S.C. § 284, and any royalties determined to be appropriate;
4. A judgment and order requiring Broadcom to pay Plaintiff pre-judgment and post-judgment interest on the damages awarded;
5. A judgment and order finding this to be an exceptional case and requiring Broadcom to pay the costs of this action (including all disbursements) and attorneys' fees as provided by 35 U.S.C. § 285; and
6. Such other and further relief as the Court deems just and equitable.

Dated: January 2, 2025

Respectfully submitted,

/s/ Patrick J. Conroy

Patrick J. Conroy

Texas Bar No. 24012448

T. William Kennedy Jr.

Texas Bar No. 24055771

Jon Rastegar

Texas Bar No. 24064043

**Nelson Bumgardner Conroy PC**

2727 N. Harwood St.

Suite 250

Dallas, TX 75201

Tel: (214) 446-4950

pat@nelbum.com

bill@nelbum.com

jon@nelbum.com

John P. Murphy

Texas Bar No. 24056024

**Nelson Bumgardner Conroy PC**

3131 W 7th St

Suite 300

Fort Worth, TX 76107

Tel: (817) 377-9111

murphy@nelbum.com

**Attorneys for Plaintiff**

**Redwood Technologies, LLC**