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

REDWOOD TECHNOLOGIES, LLC,	§	
	§	
Plaintiff,	§	
	§	**JURY TRIAL DEMANDED**
v.	§	
	§	
REALTEK SEMICONDUCTOR CORPORATION,	§	**C.A. NO. 6:25-cv-112**
	§	
Defendant.	§	

PLAINTIFF'S COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Redwood Technologies, LLC ("Redwood") files this Complaint against Defendant Realtek Semiconductor Corporation (collectively, "Realtek" or "Defendant") 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. 7,917,102 (the "'102 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, Realtek is a foreign corporation organized and existing under the laws of Taiwan with a place of business located at No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan. Realtek provides Wi-Fi compliant devices. Realtek conducts business in Texas and within this District, directly or through intermediaries, including subsidiaries, distributors, affiliates, retailers, suppliers, integrators, customers, and others.

3. Defendant is engaged (including, as relevant, in the past) in making, using, selling, offering for sale, and/or importing, and/or inducing its 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"):

- Realtek 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 Realtek's mesh devices that are compliant with IEEE 802.11 as well as their components (*e.g.*, hardware, software, and/or firmware), and processes related to the same (collectively, "Realtek Wi-Fi compliant devices"); and
- Products comprising Realtek Wi-Fi compliant devices.

4. On information and belief, Cortina Access, Inc. ("Cortina") is a California corporation with a regular and established place of business at 2130 Gold Street, Suite 250, San Jose, CA 95002. On information and belief, Cortina is a wholly-owned and wholly-controlled subsidiary of Realtek. *See* https://www.realtek.com/images/ar/2023_Annual_Report_FINAL_.pdf at p. 107.

5. On information and belief, Ubilinx Technology, Inc. ("Ubilinx") is a California corporation with a regular and established place of business at 2841 Junction Ave., San Jose, CA 95134. On information and belief, Ubilinx is a wholly-owned and wholly-controlled subsidiary of Realtek. *See* https://www.realtek.com/images/ar/2023_Annual_Report_FINAL_.pdf at p. 107.

6. On information and belief, Realtek controls (and has controlled) Cortina and Ubilinx, as well as many other subsidiaries. On information and belief, Cortina and Ubilinx provide (and have provided) sales, distribution, testing, research, and/or development support in

the United States for its ultimate parent Realtek, which owns Cortina and Ubilinx. Cortina and Ubilinx are, and have been, agents of Realtek. At the direction and control of Realtek, its subsidiaries, including Cortina and Ubilinx, and/or other U.S.-based 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. *See* https://www.realtek.com/Article/NewsDetail?id=2255&app_id=18 ("Cortina Access's high-end gateway router and PON products have consistently passed the telecommunication specifications of various countries, and have been adopted by tier 1 carriers in the US, China, Japan, and Korea. Cortina Access products can now be paired with Realtek's recently announced 4×4 11ac Wi-Fi and IoT chip (codenamed Ameba) to provide top-notch wireless gateway solutions with high throughput and QoS for the telecommunication market, thereby fulfilling all communication requirements of smart home living", said Realtek Vice President and Spokesman, Yee-Wei Huang. "As well as the product synergy arising from this transaction, it also speaks to our commitment to our customers in the telecommunication market, and demonstrates our dedication to remaining a leader in telecommunication ICs."); https://www.ublnx.com/AboutUs.html ("Ubilinx Technology is a semiconductor design company specializing in developing highly integrated solutions for various consumer electronics applications, including broadband access, multi-media signal processing, and communication links, both wired and wireless. The company has a core team of seasoned integrated circuit designers of cumulatively more than 300 years of experience in designing cost effective high performance silicon chips over a wide range of products. The company conducts product development and research, and also provides consultation service.").

7. According to Realtek, "[i]t is headquartered in Taiwan and it has ***sales or R&D teams in*** China, Singapore, ***the United States***, Japan, and South Korea." https://www.realtek.com/images/ar/-2021__20220518.pdf at 4 (emphasis added).

8. On information and belief, Defendant and its subsidiaries share directors, executives, and employees. For example, Yung-Fang Huang is a Director of Cortina as well as a Director and the Chief Operating Officer of Realtek. *See* https://www.realtek.com/images/ar/2023_Annual_Report_FINAL_.pdf at 11, 113. Furthermore, Kuang-Yu Yen is a Director of Cortina as well as a Director and the President of Realtek. *See id*. at 11, 113. In the role of President of Realtek, Kuang-Yu Yen "[p]lans and executes the Company's operational strategies and analysis; carries out Board of Directors' resolutions, investment assessments, PR statements, legal and patent affairs, international marketing, and information security." *Id*. at 10.

9. On information and belief Realtek controls (and has controlled) Cortina and Ubilinx. On information and belief, Realtek and other Realtek companies are, and have been, agents of Realtek. For example, Realtek, Cortina, Ubilinx and other subsidiaries report their financial information in the same document on behalf of Realtek. *See* https://www.realtek.com/images/ar/2023_Annual_Report_FINAL_.pdf.

10. On information and belief, Realtek, 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.

11. Realtek operates (and has operated) in agency with its 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. Realtek, 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.

12. On information and belief, Realtek, and 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. Realtek, and their U.S.-based 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 infringe 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.").

13. On information and belief, employees of Cortina are agents and employees of Realtek. Employees of Realtek and/or Cortina test and use Defendant's Accused Products in the United States. *See, e.g.*, https://www.realtek.com/Article/NewsDetail?id=2255&app_id=18 ("Cortina Access's high-end gateway router and PON products have consistently passed the telecommunication specifications of various countries, and have been adopted by tier 1 carriers in the US, China, Japan, and Korea. Cortina Access products can now be paired with Realtek's recently announced 4×4 11ac Wi-Fi and IoT chip (codenamed Ameba) to provide top-notch wireless gateway solutions with high throughput and QoS for the telecommunication market, thereby fulfilling all communication requirements of smart home living", said Realtek Vice President and Spokesman, Yee-Wei Huang. "As well as the product synergy arising from this transaction, it also speaks to our commitment to our customers in the telecommunication market, and demonstrates our dedication to remaining a leader in telecommunication ICs."); https://www.cortina-access.com/index.php/company-overview/career/senior-system-applications-engineer (job listing for a Senior Systems Applications Engineer in California to test 802.11 Wi-Fi functionality by using 802.11 Wi-Fi compliant devices).

14. Through offers to sell, sales, imports, distributions, and other related agreements to transfer ownership of Defendant's Accused Products by and/or to affiliates, distributors, subsidiaries, suppliers, retail partners, customers, and/or agents, Defendant is 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, Defendant does business in the U.S., the state of Texas, and in this District.

15. Realtek and their subsidiaries 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, Defendant operates as a single business entity and/or in concert with its affiliates, distributors, subsidiaries, suppliers, retail partners, customers, and/or agents 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.

16. Realtek, as a single enterprise of multiple operating subsidiaries acting in consort with one another, has a common Board of Directors. The collective set of Realtek entities, including Defendant, is managed, in consort, by a common management team to direct the manufacture, distribution, importation, use, and sale of Realtek products, including the Accused Products, in the United States and worldwide.

17. Prior to the filing of the Complaint, Redwood sent a letter via FedEx on November 2, 2021 to Realtek, where Redwood attempted to engage Realtek 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. Realtek refused delivery of Redwood's letter. Redwood sent a follow-up letter via FedEx on December 8, 2021 to Realtek, where Redwood again attempted to engage Realtek 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. Realtek also refused deliver of Redwood's follow-up letter. On May 22, 2022, Redwood sent another letter via FedEx to Realtek, where Redwood again attempted to engage Realtek 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. Realtek again refused delivery of Redwood's letter dated May 22, 2022.

18. Prior to the filing of the Complaint, Redwood sent several emails to different Realtek employees, where Redwood again attempted to engage Realtek 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 May 12, 2022, Redwood sent an email to Sherry Chen of Realtek that attached the 2021 notice letter, a 2022 notice letter, and access to Redwood's data room for the infringement charts of the Asserted Patents. On September 15, 2023, Redwood sent an email to Alfred Kuo of Realtek that attached the 2021 notice letters. On July 19, 2024, Redwood sent an email to Gina Hung of Realtek that attached the 2021 notice letters. Realtek refused to respond to any of Redwood's emails attempting to engage Realtek 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.

19. Indeed, Realtek has known about each of the Asserted Patents since at least May 12, 2022, September 15, 2023, and July 19, 2024 when Realtek received the email notices of its infringement of the Asserted Patents.

20. To date, Realtek has not responded to any of Redwood's attempts to license the Asserted Patents for reasonable and non-discriminatory terms. Redwood's RAND obligations to the IEEE are fulfilled because Realtek refused to engage in any licensing dialogue.

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

22. Realtek'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.

23. Realtek (individually and/or in concert with its subsidiaries, agents, affiliates, retail partners, distributors, manufacturers of end user devices, and/or customers) 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 routers, laptops, computers, TVs, automotives, IoT devices and other products that include Realtek's Wi-Fi compliant components, accused of infringement.

24. On information and belief, Realtek and its subsidiaries operate as a unitary business venture and are jointly and severally liable for the acts of patent infringement alleged herein.

25. Through offers to sell, sales, imports, distributions, and other related agreements to transfer ownership of Defendant's Accused Products by and/or to affiliates, distributors, subsidiaries, suppliers, business partners, retail partners, customers, and/or agents, Defendant is operating in (and has operated in) and maintaining (and maintained) a significant business presence in the U.S. and/or through its U.S. subsidiaries or agents, Defendant has done (and does) business in the U.S., the state of Texas, and in the Western District of Texas.

JURISDICTION AND VENUE

26. Plaintiff incorporates paragraphs 1 through 25 herein by reference.

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

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

29. Venue is proper for Defendant in this District pursuant to 28 U.S.C. §§ 1391(c). Defendant is a foreign entity and may be sued in any judicial district under 28 U.S.C. § 1391(c)(3).

30. This Court has general and specific personal jurisdiction over the Defendant pursuant to due process and/or the Texas Long Arm Statute because, inter alia, (i) the Defendant has done and continue to do business in Texas and/or (ii) the Defendant has, directly and through intermediaries, distributers, agents, and/or others committed and continues to commit acts of patent infringement in the State of Texas, including making, using, offering to sell, and/or selling Accused Products in Texas, and/or importing Accused Products into Texas, including by Internet sales and/or sales via business partners, retail and wholesale stores, inducing others to commit acts of patent infringement in Texas, and/or committing at least a portion of any other infringements alleged herein. Defendant has placed, and is continuing to place, infringing products into the stream of commerce, via established distribution channels, with the knowledge and/or understanding that such products are sold in Texas, including in this District. Defendant has derived substantial revenues from its infringing acts occurring within Texas and within this District. Defendant has substantial business in this State and District (including, as relevant, in the past), including: (A) conducting at least part of its infringing activities alleged herein; and (B) regularly doing or soliciting business, engaging in other persistent conduct, and/or deriving substantial revenue from infringing goods offered for sale, sold, and/or imported, and services provided to Texas residents vicariously through and/or in concert with its respective alter egos, intermediaries, agents, distributors, importers, customers, subsidiaries, and/or consumers.

31. On information and belief, Defendant sells its Accused Products (e.g., 802.11 Wi-Fi compliant components) to its customers knowing those accused components will be incorporated into products imported, offered for sale, sold, and/or used in the United States. Indeed, downstream Accused Products (e.g., TVs, laptops, routers, etc.) incorporating Defendant's Accused Products are on sale and have been sold by retailers, such as Walmart and Amazon, in the United States, the state of Texas, and this District. *See, e.g., Parkervision, Inc. v. Realtek Semiconductor Corp.*, No. 6:23-CV-00374- ADA, Dkt. No. 31 (W.D. Tex. Nov. 1, 2023) at ¶¶ 25-26; *Bandspeed, LLC v. Realtek Semiconductor Corporation*, No. 1:20-CV-00765-LY, Dkt. No. 22 (W.D. Tex. Mar. 13, 2022) at ¶¶ 23-26.

32. On information and belief, Defendant's Accused Products are incorporated into Asus downstream products that are offered for sale, sold, imported, and/or used in the United States and this District. *See, e.g.*, https://www.asus.com/supportonly/f1502za/helpdesk_download/.

33. On information and belief, Defendant's Accused Products are also incorporated into Lenovo downstream products that are offered for sale, sold, imported, and/or used in the United States and this District. *See, e.g.*, https://support.lenovo.com/us/en/downloads/ds104538-realtek-wifi-driver-for-windows-10-32-bit-64-bit-desktop.

34. Defendant has employees in the United States, including Defendant's employees that work in the United States at Cortina and Ubilinx.

35. In addition, Defendant is aware that the Accused Products are shipped to, and used in, the United States given that they obtain authorization from the U.S. Federal Communications Commission ("FCC") for the Accused Products so that that the Accused Products comply with the laws and regulations of the United States. *See, e.g.*, https://fccid.io/TX2.

36. Also, given the Defendant's history as a supplier of the Accused Products to known manufacturers of Wi-Fi devices in the United States market, Defendant has knowledge that such manufacturers (*e.g.*, Asus, Lenovo, etc.) have substantial operations in the United States, as well as substantial market share in the United States market for Wi-Fi devices. Defendant is well-aware that the Accused Products are destined for the United States and Texas (e.g., via Realtek and other manufacturers' supply chains, distributers, retailers, etc.). Indeed, the U.S. market for the Accused Products is substantial.

37. This Court has personal jurisdiction over Defendant, directly or through agents, intermediaries, distributors, importers, business partners, customers, subsidiaries, and/or consumers. Through direction and control (including, as relevant, in the past) of such subsidiaries, affiliates, business partners, distributors, retail partners, agents, and/or customers, Defendant has committed acts of direct and/or indirect patent infringement within Texas, and elsewhere within the United States, giving rise to this action and/or have established minimum contacts with Texas such that personal jurisdiction over Defendant would not offend traditional notions of fair play and substantial justice. Upon information and belief, Defendant compensate its U.S.-based subsidiaries and/or agents for their sales and/or technical support services in the United States. As such, Defendant has a direct financial interest in its U.S.-based subsidiaries and/or agents, and/or partners, distributers, or customers, and vice versa.

38. Personal jurisdiction is proper because Defendant has committed acts of infringement in this District. This Court has personal jurisdiction over Defendant because, inter alia, this action arises from activities Defendant purposefully directed towards the State of Texas and this District.

39. Exercising personal jurisdiction over Defendant in this District would not be unreasonable given Defendant's contacts in this District, the interest in this District of resolving disputes related to products sold herein, and the harm that would occur to Plaintiff who resides in this District.

40. In addition, Defendant has knowingly induced infringement within this District by advertising, marketing, offering for sale and/or selling devices pre-loaded with infringing functionality within this District, to consumers, customers, manufacturers, distributors, resellers, partners, end users, and providing instructions, user manuals, advertising, and/or marketing materials which facilitate, direct or encourage the use of infringing functionality with knowledge thereof.

41. For example, Defendant's website advertises the type of components and Accused Products that are infringing in this case. Indeed, Defendant provides technical support directed specifically to its customers in the United States, including customers that purchased and/or used the Accused Products in the United States. *See* https://www.realtek.com/Article/Index?menu_id=850.

42. Personal jurisdiction also exists specifically over Defendant because Defendant, directly or through affiliates, subsidiaries, business partners, agents, and/or intermediaries, transact business (or have transacted business) in this State or purposefully directed business at this State by making, importing, offering to sell, selling, and/or having sold infringing products within this State and District or purposefully directed at this State or District.

43. To the extent Defendant is not subject to jurisdiction in any state's court of general jurisdiction, exercising jurisdiction over Defendant in this State and this District would be

consistent with due process and this State's long-arm statute and under national contacts in light of the facts alleged in this Complaint.

44. In addition, Defendant, directly or through affiliates, subsidiaries, agents, and/or intermediaries, have placed infringing products into the stream of commerce knowing they would be sold and used in Texas, and economically benefit from the retail sale of infringing products in this State, including in this District.

45. Defendant has advertised its infringing products to customers in Texas and this District through its website.

46. On information and belief, Defendant controls (or has controlled) or otherwise direct (or directed) and authorizes (or authorized) all activities of its U.S.-based (or foreign-based with the knowledge that the Accused Products are directed to the United States and this District) agents and/or subsidiaries. Such directed and authorized activities include the U.S.-based (and/or foreign-based) subsidiaries' and/or agents having used, offered for sale, sold, and/or imported the Accused Products, their components, processes, and/or products containing the same that incorporated the fundamental technologies and claims of the Asserted Patents. Defendant's U.S.-based (and/or foreign-based) subsidiaries and/or agents were authorized to import, distribute, sell, use, or offer for sale the Accused Products on behalf of Defendant. For example, Defendant researched, designed, developed, and manufactured the Accused Products, and then directed its U.S.-based (and/or foreign-based) subsidiaries, distributers, business partners agents, and/or others to import, distribute, offer for sale, use, and sell the Accused Products in the United States. *See, e.g., United States v. Hui Hsiung*, 778 F.3d 738, 743 (9th Cir. 2015) (finding that the sale of infringing products to third parties rather than for direct import into the U.S. did not "place [defendants'] conduct beyond the reach of United States law [or] escape culpability under the

rubric of extraterritoriality"). Thus, Defendant conducted infringing activities, and Defendant's U.S.-based (and foreign-based) subsidiaries and/or distributers and/or agents and/or business partners conducted infringing activities on behalf of Defendant.

47. On information and belief, Defendant's' U.S.-based (and/or foreign-based) subsidiaries' and/or agents' presence (including in the past) in the United States gave Defendant substantially the same business advantages that it would have enjoyed if Defendant conducted its business through its own offices or paid agents. Defendant's U.S.-based (and/or foreign-based) subsidiaries and/or distributers and/or agents were authorized to import, distribute, sell, and offer for sale Defendant's products, including the Accused Products, as well as their components and processes related to the same, on behalf of Defendant. For example, Defendant's U.S.-based (and/or foreign-based) subsidiaries and/or agents operated within Defendant's global network and supply chain of sales. In the U.S., including within the Western District of Texas, the Accused Products, as well as their components and processes related to the same, were imported, distributed, offered for sale, and/or sold.

48. Via Defendant's alter egos, agents, business partners, intermediaries, distributors, importers, customers, subsidiaries, and/or consumers that maintained a business presence, operating in, and/or residing in the U.S., Defendant's products, including products and processes accused of infringing the Asserted Patents, are or have been widely distributed and sold in Texas including within this District. *See Litecubes, LLC v. Northern Light Products, Inc.*, 523 F.3d 1353, 1369-70 (Fed. Cir. 2008) ("[T]he sale [for purposes of § 271] occurred at the location of the buyer."); *see also Semcon IP Inc. v. Kyocera Corp.*, No. 2:18-cv-00197-JRG, 2019 WL 1979930, at *3 (E.D. Tex. May 3, 2019) (denying accused infringer's motion to dismiss because plaintiff

sufficiently plead that purchases of infringing products outside of the United States for importation into and sales to customers in the U.S. may constitute an offer to sell under § 271(a)).

49. On information and belief, Defendant has placed infringing products and/or products that practiced infringing processes into the stream of commerce via established distribution channels comprising at least its subsidiaries, business partners, affiliates, distributors, and/or agents or customers, with the knowledge and/or intent that those products were imported, used, offered for sale, and sold in the United States and Texas, including in this District. As a result, Defendant has, vicariously through and/or in concert with alter egos, agents, intermediaries, distributors, affiliates, importers, customers, subsidiaries, and/or consumers, placed the Accused Products into the stream of commerce via established distribution channels with the knowledge and/or intent that those products were sold and continue to be sold in the United States and Texas, including in this District.

50. The minimum contacts test is satisfied because Defendant delivers its Accused Products (e.g., Wi-Fi compliant devices) into the stream of commerce with the expectation that they will be purchased by consumers in Texas. *Beverly Hills Fan Co. v. Royal Sovereign Corp.*, 21 F.3d 1558, 1566 (Fed. Cir. 1994) (quoting *World-Wide Volkswagen Corp. v. Woodson*, 100 S. Ct. 559 (1980)). For example, and on information and belief (and as provided for herein), Defendant imports, and/or has imported and/or shipped infringing Accused Products into the United States through and with its supply chain partners, distributors, and/or customers (including, but not limited to, Asus and Lenovo). Defendant supplies its Accused Products (e.g., Wi-Fi compliant devices) to customers knowing that its accused products will be incorporated into accused downstream Wi-Fi compliant products (e.g., TVs, laptops, routers) that are offered for sale, sold, imported, and/or used by Asus, Lenovo, Walmart, and/or Amazon in the United States

and this District. The Accused Products were (and are) directed to this District and were (and are) available for purchase in this District via retailers, such as Asus, Lenovo, Walmart, and Amazon. The lengthy and complex distribution chain does not insulate Defendant from suit in Texas.

51. Defendant intentionally placed its Accused Products in a distribution chain flowing from Asia to the United States, Texas, and this District. For example, Defendant intentionally places its Accused Products in a distribution or supply chain knowing that such Accused Products ultimately arrive in the United States market and this District through, at least, laptops, TVs, and/or routers manufactured by its customers, such as Asus and Lenovo. Defendant, through its sales of Wi-Fi compliant devices for application in downstream Wi-Fi devices knew (or should have reasonably known) the likely destination of the products, where Defendant's conduct and connections with Texas and this District were such that Defendant should have reasonably anticipated being brought to court in this District.

52. Indeed, Defendant sought authorization from the FCC so that its Accused Products were authorized for operation at approved frequencies so that the Accused Products would be authorized for sale within the United States. Defendant's activities with the FCC further evidence that Defendant knew or should have known that its products were destined for the United States and this District.

53. Moreover, Defendant is the assignee of a substantial number of United States patents and patent applications, including use of U.S. patent counsel to procure such patents in their name. Thus, Defendant sought out the United States market, evidenced by seeking patent protection in the United States.

54. Realtek has substantial contacts with the U.S. based on its substantial contacts with standards bodies. Realtek is a member of the IEEE 802.11 standards group and does business with

the IEEE. https://www.ieee802.org/11/members.html. The IEEE has corporate headquarters in New York and its operation centers in New Jersey. Furthermore, Realtek does business with the Wi-Fi Alliance, which is located in Austin, Texas and this District. Realtek has certified over 100 products through the Wi-Fi Alliance, including certain of its Accused Products.

55. Also by way of example, and on information and belief, Defendant has (and have had) U.S. based (and/or foreign-based) employees that work in connection with the Accused Products, including, but not limited to, employees who research, design, sell, import, and/or test the Accused Products in the United States. On information and belief, John Coffey is a Realtek employee who serves as a voting member of the IEEE 802.11 working group on behalf of Realtek. *See* https://www.ieee802.org/11/members.html. On information and belief, John Coffey resides and works in San Francisco in the United States. *See, e.g.*, https://patentimages.storage.googleapis.com/fc/63/82/2082106ec279a5/US11152963.pdf at 1.

56. Moreover, Realtek is an annual participant in the Consumer Electronics Show ("CES") held annually in Las Vegas. Realtek has imported, presented, demonstrated, offered for sale, and used certain Accused Products in the United States at the CES each year since at least 2017. *See, e.g.*, https://www.realtek.com/Article/NewsDetail?id=4244&app_id=18.

57. Indeed, Realtek advertises that its products for sale in the USA can be purchased via its distributors Future Electronics or WPG Americas Inc., which is located in San Jose, CA. https://www.realtek.com/Sales/Distributors?cate_id=481&menu_id=852. Indeed, Future Electronics offered for sale Realtek's RTL8723D, an Accused Product, as of March 2022. *See Bandspeed, LLC v. Realtek Semiconductor Corporation*, No. 1:20-CV-00765-LY, Dkt. No. 22 (W.D. Tex. Mar. 13, 2022) at ¶ 21.

58. Defendant has an ongoing commercial relationship with entities of Asus, Lenovo, and/or other downstream manufacturers of Wi-Fi devices incorporating Defendant's Accused Products, and Defendant accessed the Texas consumer-electronics market vis-à-vis those relationships. Given Defendant's relationship with such behemoths in the United States market, jurisdiction in this Court is fair and reasonable.

59. In the alternative, the Court has personal jurisdiction over Defendant under Federal Rule of Civil Procedure 4(k)(2), because the claims for patent infringement in this action arise under federal law, Defendant is not subject to the jurisdiction of the courts of general jurisdiction of any state and exercising jurisdiction over Defendant is consistent with the U.S. Constitution. Exercising jurisdiction comports with due process given Defendant's purposeful availment from the sales of downstream Wi-Fi products (e.g., TVs, laptops, routers, etc.) incorporating Defendant's Accused Products sold in the Unites States and this District.

60. With respect to the '457 patent, '140 patent, and '102 patent, the Accused Products are devices that include, but are not limited to, Realtek's devices and third party devices that include one or more of Realtek'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 BE3600 (RTL8198E/RTL8932AR/RTL8902AR/RTL8221B), BE7200 (RTL8198E/RTL8934AR/ RTL8294XAR/RTL8221B), RTL8188EE, RTL8188ETV, RTL8188EUS, RTL8188FTV, RTL8189EM, RTL8189EM-VI, RTL8189ES, RTL8189ETV, RTL8189FTV, RTL8192EE, RTL8192ER, RTL8192ES, RTL8192EU, RTL8194AR, RTL8195AM, RTL8196E, RTL8197F, RTL8710BN, RTL8710CM, RTL8711AF, RTL8711AM, RTL8720CM, RTL8721DM, RTL8722CSM, RTL8722DM, RTL8723BE, RTL8723BS, RTL8723BU, RTL8723DE, RTL8723DS, RTL8723DU, RTL8811AE, RTL8811AU, RTL8811CU, RTL8812AE,

RTL8812AR, RTL8812AU, RTL8812BRH, RTL8812BU, RTL8814AE, RTL8814AR, RTL8814AU, RTL8821AE, RTL8821AS, RTL8821AU, RTL8821CE, RTL8821CS, RTL8821CU, RTL8822BE, RTL8822BEH-VR, RTL8822BS, RTL8822BU, RTL8822CE, RTL8852AE, RTL8852BE, RTL8188EE, RTL8720C, RTL8730E, RTL8715Ax, RTL8851BE, RTL8852CE, RTL8922 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, Realtek's devices and third party devices that include one or more of Realtek'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 BE3600 (RTL8198E/RTL8932AR/RTL8902AR/RTL8221B), BE7200 (RTL8198E/RTL8934AR/ RTL8294XAR/RTL8221B), RTL8192EE, RTL8192ER, RTL8192ES, RTL8192EU, RTL8194AR, RTL8812AE, RTL8812AR, RTL8812AU, RTL8812BRH, RTL8812BU, RTL8814AE, RTL8814AR, RTL8814AU, RTL8822BE, RTL8822BEH-VR, RTL8822BS, RTL8822BU, RTL8851BE, RTL8852CE, RTL8922 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, Realtek's devices and third party devices that include one or more of Realtek's devices that are compliant with Wi-Fi Multimedia ("WMM") (*e.g.*, the RTL8721DG, RTL8922, RTL8730E, RTL8851BE, RTL8720C, RTL8852BE, RTL8852CE, RTL8722DM, RTL8852AE, RTK AX1800, RTK AC1200, Realtek RTL8822BE, RTL8821CE, RTL8822CE, RTL8723DE, RTL8812BU, RTL8812AR, RTL8812AE, RTL8723BS, RTL8812AE, RTL8192DU, RTD1185PA01, RTL8723BE,

NFA92E00, RTK001 series) as well as their components (*e.g.*, hardware, software, and/or firmware), and processes related to the same.[1]

COUNT I

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

61. Plaintiff incorporates paragraphs 1 through 60 herein by reference.

62. 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.

63. 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.

64. Realtek 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.

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

66. Furthermore, Realtek directly infringes the ’457 patent through its direct involvement in the activities of its subsidiaries, including Cortina and Ubilinx. 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

[1] Each of the relevant standards cited herein, and related to the Asserted Patents, are specifically incorporated into this Complaint.

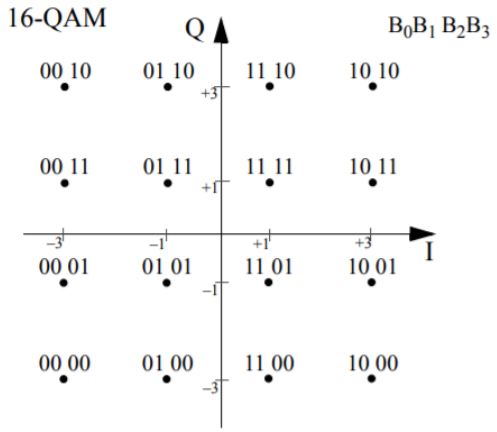
components and processes, and/or products containing the same that incorporated the fundamental technologies covered by the '457 patent. Further, Defendant is vicariously liable for this infringing conduct of its subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, Realtek and its subsidiaries and related companies are essentially the same company, and Realtek has 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, Realtek 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 Realtek'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).

67. For example, Realtek infringes claim 1 of the '457 patent via the Accused Products, including the RTL8812BU. The Accused Products, including the RTL8812BU, 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.realtek.com/Product/Index?id=576&cate_id=194 (RTL8812BU is compliant with IEEE 802.11n and IEEE 802.11ac. "The Realtek RTL8812BU-CG is a highly integrated single-chip that supports 2-stream 802.11ac solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) and Wireless LAN (WLAN) USB interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single chip.").

68. The Accused Products, including the RTL8812BU, 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.

69. The Accused Products, including the RTL8812BU, 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 RTL8812BU, 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).

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

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:

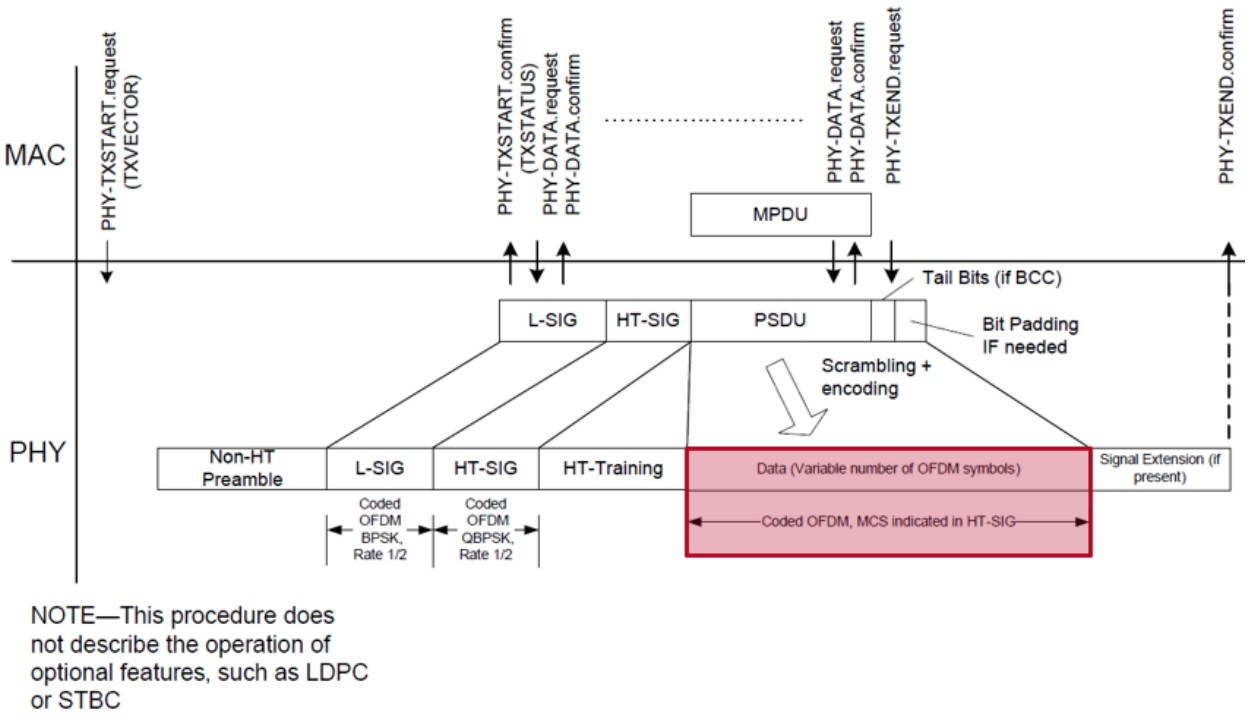


Figure 19-22—PHY transmit procedure (HT-mixed format PPDU)

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

70. 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 at slides 67-68 (the HT-mixed format PPDU is mandatory). Thus, the Accused Devices, including the RTL8812BU, must be configured pursuant to Figures 19-1 and 19-22, as described above.

71. The Accused Products, including the RTL8812BU, 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 RTL8812BU, 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:

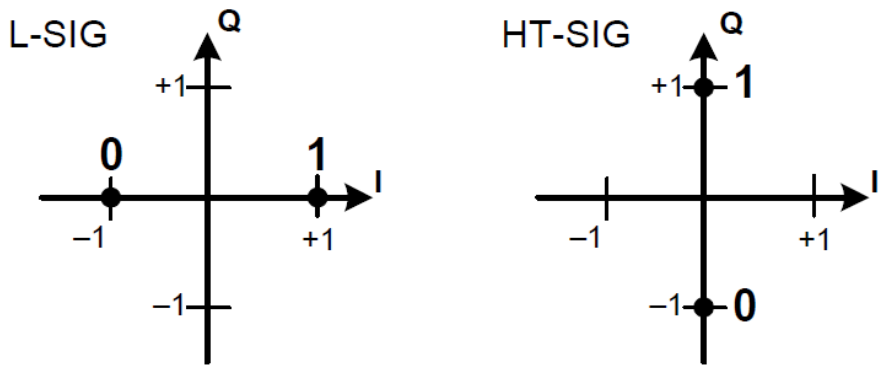


Figure 19-7—Data tone constellations in an HT-mixed format PPDU

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).

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

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.

72. The specific ways in which the Accused Products, including the RTL8812BU, are configured to support the aforementioned features of IEEE 802.11n and/or IEE 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 RTL8812BU, as to at least Claim 1 of the ’457 patent.

73. Furthermore, the Accused Products, including the RTL8812BU, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the ’457 patent.

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

75. 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.

76. At a minimum, Realtek has known of the '457 patent at least as early as the filing date of the Complaint. In addition, Realtek has known about the '457 patent since at least May 12, 2022, when Realtek received notice of its infringement of the '457 patent via an email sent by Redwood to Sherry Chen of Realtek. The May 12, 2022 email also provided Realtek access to Redwood's data room for the infringement chart of the '457 patent, which provided further notice of Realtek's infringement. The May 12, 2022 email also attached two notice letters regarding the '457 patent originally sent to Realtek via FedEx on November 2, 2021 and December 8, 2021, where Realtek refused to accept delivery of the 2021 notice letters. On May 22, 2022, Redwood sent another notice letter via FedEx regarding Realtek's infringement of the '457 patent, where Realtek again refused to accept delivery of the 2022 notice letter. In addition, Realtek has known about the '457 patent since at least September 15, 2023, when Realtek again received notice of its infringement of the '457 patent via an email sent by Redwood to Alfred Kuo of Realtek. Furthermore, Realtek has known about the '457 patent since at least July 19, 2024, when Realtek again received notice of its infringement of the '457 patent via an email sent by Redwood to Gina Hung of Realtek. Realtek refused Redwood's notice letters delivered by FedEx and refused to respond to any of Redwood's emails.

77. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek 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, Realtek does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '457 patent. Realtek 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.

78. On information and belief, despite having knowledge of the '457 patent and its infringement, Defendant specifically intended for others to import and sell products accused of infringing the '457 patent. For example, Defendant 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 Realtek's Accused Products. On information and belief, Defendant 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 Realtek, its subsidiaries, distributors, downstream manufacturers that incorporate Realtek's Accused Products into Wi-Fi products, and/or importers provide such instruction and/or encouragement. Further, on information and belief, Defendant's 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.

79. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek'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, Realtek 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, Realtek 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.

80. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek'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, Realtek 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 Realtek 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, Realtek 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 Realtek 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. Realtek 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.

81. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek'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, Realtek 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, Realtek 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.

82. 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, Realtek has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Realtek’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.

83. Redwood has been damaged as a result of Realtek’s infringing conduct described in this Count. Realtek is, thus, liable to Redwood in an amount that adequately compensates Redwood for Realtek’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)

84. Plaintiff incorporates paragraphs 1 through 83 herein by reference.

85. 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.

86. 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.

87. Realtek 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.

88. Realtek 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, Realtek infringes each step of the one or more method claims of the ’485 patent because the Realtek Accused Products automatically, and without user modification, perform each of the claimed steps that are controlled by Realtek.

89. Furthermore, Furthermore, Realtek directly infringes the ’485 patent through its direct involvement in the activities of its subsidiaries, including Cortina and Ubilinx. 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, Defendant is vicariously liable for this infringing conduct of its respective subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, Realtek and its subsidiaries and related companies are essentially the same company, and Realtek has 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, Realtek 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 Realtek’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).

90. Realtek infringes claim 1 of the ’485 patent via the Accused Products, including the RTL8812BU. The Accused Products, including the RTL8812BU, are compliant with the Wi-Fi Alliance WMM requirements. *See, e.g.*, https://www.wi-fi.org/product-finder-results?keywords=RTL8812BU (compliance with WMM (Wireless Multi-Media)):

Certification ID: WFA67454

Date of Last Certification: Feb 16, 2017
Brand: Realtek Semiconductor Corporation
Category: External Adapter
Product Name: Realtek RTL8812BU 2T2R 802.11ac/abgn USB Adapter
Model Number: RTL8812BU USB
Total Variants: 2

Variant #1 of 2 matches

Date of Certification: Feb 16, 2017
Product Model Variant: 2017-02-17 (WFA67454 - 5085297)
Operating System: Windows 10
Frequency Band(s): 2.4 GHz; 5 GHz

Summary of Certifications for Variant #1

CLASSIFICATION	PROGRAM
Security	Protected Management Frames
	WPA2™-Enterprise
	WPA2™-Personal
Spectrum & Regulatory Features	Spectrum & Regulatory
Connectivity	Wi-Fi CERTIFIED™ ac
	Wi-Fi CERTIFIED™ n
	Wi-Fi CERTIFIED™ a
	Wi-Fi CERTIFIED™ b
	Wi-Fi CERTIFIED™ g
	2.4 GHz Spectrum Capabilities
	5 GHz Spectrum Capabilities
Applications & Services	Wi-Fi Location™
Optimization	WMM®

91. The Accused Products, including the RTL8812BU, 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.realtek.com/Product/Index?id=576&cate_id=194 (RTL8812BU is

compliant with IEEE 802.11n and IEEE 802.11ac. "The Realtek RTL8812BU-CG is a highly integrated single-chip that supports 2-stream 802.11ac solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) and Wireless LAN (WLAN) USB interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single chip.").

92. The Accused Products, including the RTL8812BU, 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.

93. The Accused Products, including the RTL8812BU, 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.

94. The Accused Products, including the RTL8812BU, 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.

95. The Accused Products, including the RTL8812BU, each aggregate a plurality of specifications for a plurality of traffic steams 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.

96. The Accused Products, including the RTL8812BU, 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.

97. The specific ways in which the Accused Products, including the RTL8812BU, 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 RTL8812BU, as to Claim 1 of the '485 patent.

98. Furthermore, the Accused Products, including the RTL8812BU, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '485 patent.

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

100. 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.

101. At a minimum, Realtek has known of the '485 patent at least as early as the filing date of the Complaint. In addition, Realtek has known about the '485 patent since at least May 12, 2022, when Realtek received notice of its infringement of the '485 patent via an email sent by Redwood to Sherry Chen of Realtek. The May 12, 2022 email also provided Realtek access to Redwood's data room for the infringement chart of the '485 patent, which provided further notice of Realtek's infringement. The May 12, 2022 email also attached two notice letters regarding the '485 patent originally sent to Realtek via FedEx on November 2, 2021 and December 8, 2021, where Realtek refused to accept delivery of the 2021 notice letters. On May 22, 2022, Redwood sent another notice letter via FedEx regarding Realtek's infringement of the '485 patent, where Realtek again refused to accept delivery of the 2022 notice letter. In addition, Realtek has known

about the ’485 patent since at least September 15, 2023, when Realtek again received notice of its infringement of the ’485 patent via an email sent by Redwood to Alfred Kuo of Realtek. Furthermore, Realtek has known about the ’485 patent since at least July 19, 2024, when Realtek again received notice of its infringement of the ’485 patent via an email sent by Redwood to Gina Hung of Realtek. Realtek refused Redwood’s notice letters delivered by FedEx and refused to respond to any of Redwood’s emails.

102. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek 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, Realtek does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the ’485 patent. Realtek 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 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.

103. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek'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, Realtek 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 Realtek 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, Realtek 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.

104. 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, Realtek has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Realtek'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.

105. Redwood has been damaged as a result of Realtek's infringing conduct described in this Count. Realtek is, thus, liable to Redwood in an amount that adequately compensates Redwood for Realtek'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)

106. Plaintiff incorporates paragraphs 1 through 105 herein by reference.

107. 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.

108. 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.

109. Realtek 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.

110. Realtek 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.

111. Furthermore, Realtek directly infringes the '555 patent through its direct involvement in the activities of its subsidiaries, including Cortina and Ubilinx. 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, Defendant is 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, Realtek and its subsidiaries and related companies are essentially the same company, and Realtek has 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, Realtek 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 Realtek’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).

112. For example, Realtek infringes claim 1 of the ’555 patent via the Accused Products, including the RTL8812BU. The Accused Products, including the RTL8812BU, 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.realtek.com/Product/Index?id=576&cate_id=194 (RTL8812BU is compliant with

IEEE 802.11n and IEEE 802.11ac. "The Realtek RTL8812BU-CG is a highly integrated single-chip that supports 2-stream 802.11ac solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) and Wireless LAN (WLAN) USB interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single chip.").

113. For example, each of the Accused Products, including the RTL8812BU, 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 μs 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.

114. The Accused Products, including the RTL8812BU, 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.

115. The Accused Products, including the RTL8812BU, 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 μs 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.

116. When the OFDM signals are transmitted from two antennas of the Accused Products, including the RTL8812BU, 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.

117. When the OFDM signals are transmitted from two antennas of the Accused Products, including the RTL8812BU, 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.

118. When the OFDM signals are transmitted from two antennas of the Accused Products, including the RTL8812BU, 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.

119. The specific ways in which the Accused Products, including the RTL8812BU, 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.

120. Furthermore, the Accused Products, including the RTL8812BU, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '555 patent.

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

122. 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.

123. 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.

124. 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.

125. 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.

126. 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.

127. At a minimum, Realtek has known of the ’555 patent at least as early as the filing date of the Complaint. In addition, Realtek has known about the ’555 patent since at least May 12, 2022, when Realtek received notice of its infringement of the ’555 patent via an email sent by Redwood to Sherry Chen of Realtek. The May 12, 2022 email also provided Realtek access to Redwood’s data room for the infringement chart of the ’555 patent, which provided further notice of Realtek’s infringement. The May 12, 2022 email also attached two notice letters regarding the ’555 patent originally sent to Realtek via FedEx on November 2, 2021 and December 8, 2021, where Realtek refused to accept delivery of the 2021 notice letters. On May 22, 2022, Redwood sent another notice letter via FedEx regarding Realtek’s infringement of the ’555 patent, where Realtek again refused to accept delivery of the 2022 notice letter. In addition, Realtek has known about the ’555 patent since at least September 15, 2023, when Realtek again received notice of its infringement of the ’555 patent via an email sent by Redwood to Alfred Kuo of Realtek. Furthermore, Realtek has known about the ’555 patent since at least July 19, 2024, when Realtek again received notice of its infringement of the ’555 patent via an email sent by Redwood to Gina Hung of Realtek. Realtek refused Redwood’s notice letters delivered by FedEx and refused to respond to any of Redwood’s emails.

128. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek 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, Realtek does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the ’555 patent. Realtek 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.

129. On information and belief, despite having knowledge of the ’555 patent and its infringement, Defendant specifically intended for others to import and sell products accused of infringing the ’555 patent. For example, Defendant 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, Defendant 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 Realtek, its subsidiaries, distributors, downstream manufacturers that incorporate Realtek’s Accused Products into Wi-Fi products, and/or importers provide such instruction and/or encouragement. Further, on information and belief, Defendant’s 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.

130. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek’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, Realtek 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, Realtek 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.

131. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek’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, Realtek 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 Realtek 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, Realtek 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 Realtek 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. Realtek 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.

132. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek'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, Realtek 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, Realtek 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.

133. 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, Realtek has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Realtek’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.

134. Redwood has been damaged as a result of Realtek’s infringing conduct described in this Count. Realtek is, thus, liable to Redwood in an amount that adequately compensates Redwood for Realtek’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)

135. Plaintiff incorporates paragraphs 1 through 134 herein by reference.

136. 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.

137. 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.

138. Realtek 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.

139. Realtek 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.

140. Furthermore, Realtek directly infringes the ’140 patent through its direct involvement in the activities of its subsidiaries, including Cortina and Ubilinx. 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, Defendant is 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, Realtek and its subsidiaries and related companies are essentially the same company, and Realtek has 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, Realtek 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

Realtek'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).

141. For example, Realtek infringes claim 1 of the '140 patent via the Accused Products, including the RTL8812BU. The Accused Products, including the RTL8812BU, comprise a transmitting apparatus, in an orthogonal frequency division multiplexing communication system. *See, e.g.*, https://www.realtek.com/Product/Index?id=576&cate_id=194 (RTL8812BU is compliant with IEEE 802.11n and IEEE 802.11ac. "The Realtek RTL8812BU-CG is a highly integrated single-chip that supports 2-stream 802.11ac solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) and Wireless LAN (WLAN) USB interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single chip.").

142. The Accused Products, including the RTL8812BU, 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 RTL8812BU, convert PSDUs into PPDUs. *See, e.g.*, Sections 17.3.1 and 17.3.2.1 of IEEE 802.11 2016.

143. The Accused Products, including the RTL8812BU, 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 RTL8812BU, generates a PPDU 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 RTL8812BU, 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 PPDU 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 PPDU frame. *See, e.g.*, Figure 17-4 of IEEE 802.11 2016.

144. The Accused Products, including the RTL8812BU, 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.

145. The specific ways in which the Accused Products, including the RTL8812BU, 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.

146. Furthermore, the Accused Products, including the RTL8812BU, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the ’140 patent.

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

148. 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.

149. 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.

150. At a minimum, Realtek has known of the '140 patent at least as early as the filing date of the Complaint. In addition, Realtek has known about the '140 patent since at least May 12, 2022, when Realtek received notice of its infringement of the '140 patent via an email sent by

Redwood to Sherry Chen of Realtek. The May 12, 2022 email also provided Realtek access to Redwood's data room for the infringement chart of the '140 patent, which provided further notice of Realtek's infringement. The May 12, 2022 email also attached two notice letters regarding the '140 patent originally sent to Realtek via FedEx on November 2, 2021 and December 8, 2021, where Realtek refused to accept delivery of the 2021 notice letters. On May 22, 2022, Redwood sent another notice letter via FedEx regarding Realtek's infringement of the '140 patent, where Realtek again refused to accept delivery of the 2022 notice letter. In addition, Realtek has known about the '140 patent since at least September 15, 2023, when Realtek again received notice of its infringement of the '140 patent via an email sent by Redwood to Alfred Kuo of Realtek. Furthermore, Realtek has known about the '140 patent since at least July 19, 2024, when Realtek again received notice of its infringement of the '140 patent via an email sent by Redwood to Gina Hung of Realtek. Realtek refused Redwood's notice letters delivered by FedEx and refused to respond to any of Redwood's emails.

151. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek 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, Realtek does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '140 patent. Realtek 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.

152. On information and belief, despite having knowledge of the ’140 patent and its infringement, Defendant specifically intended for others to import and sell products accused of infringing the ’140 patent. For example, Defendant 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, Defendant 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 Realtek, its subsidiaries, distributors, downstream manufacturers that incorporate Realtek’s Accused Products into Wi-Fi products, and/or importers provide such instruction and/or encouragement. Further, on information and belief, Defendant’s 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.

153. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek’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, Realtek 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, Realtek 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.

154. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek'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, Realtek 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 Realtek 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, Realtek 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 Realtek 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. Realtek 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.

155. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek'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, Realtek 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, Realtek 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.

156. 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, Realtek has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Realtek'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.

157. Redwood has been damaged as a result of Realtek's infringing conduct described in this Count. Realtek is, thus, liable to Redwood in an amount that adequately compensates Redwood for Realtek'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)

158. Plaintiff incorporates paragraphs 1 through 157 herein by reference.

159. 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.

160. 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.

161. Realtek 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.

162. Realtek 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.

163. Furthermore, Realtek directly infringes the ’209 patent through its direct involvement in the activities of its subsidiaries, including Cortina and Ubilinx. 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, Defendant is 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, Realtek and its subsidiaries and related companies are essentially the same company, and Realtek has 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, Realtek 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 Realtek’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).

164. For example, Realtek infringes claim 1 of the '209 patent via the Accused Products, including the RTL8812BU. The Accused Products, including the RTL8812BU, 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.realtek.com/Product/Index?id=576&cate_id=194 (RTL8812BU is compliant with IEEE 802.11n and IEEE 802.11ac. "The Realtek RTL8812BU-CG is a highly integrated single-chip that supports 2-stream 802.11ac solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) and Wireless LAN (WLAN) USB interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single chip.").

165. The Accused Products, including the RTL8812BU, 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.

166. 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.

167. 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.

168. The Accused Products, including the RTL8812BU, 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.

169. The Inverse Fourier transformer of each of the Accused Products, including the RTL8812BU, 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 μs 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.

170. The transmitter of each of the Accused Products, including the RTL8812BU, 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.

171. The specific ways in which the Accused Products, including the RTL8812BU, 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.

172. Furthermore, the Accused Products, including the RTL8812BU, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '209 patent.

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

174. 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.

175. 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.

176. 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.

177. 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.

178. At a minimum, Realtek has known of the '209 patent at least as early as the filing date of the Complaint. In addition, Realtek has known about the '209 patent since at least May 12, 2022, when Realtek received notice of its infringement of the '209 patent via an email sent by Redwood to Sherry Chen of Realtek. The May 12, 2022 email also provided Realtek access to Redwood's data room for the infringement chart of the '209 patent, which provided further notice of Realtek's infringement. The May 12, 2022 email also attached two notice letters regarding the '209 patent originally sent to Realtek via FedEx on November 2, 2021 and December 8, 2021, where Realtek refused to accept delivery of the 2021 notice letters. On May 22, 2022, Redwood

sent another notice letter via FedEx regarding Realtek's infringement of the '209 patent, where Realtek again refused to accept delivery of the 2022 notice letter. In addition, Realtek has known about the '209 patent since at least September 15, 2023, when Realtek again received notice of its infringement of the '209 patent via an email sent by Redwood to Alfred Kuo of Realtek. Furthermore, Realtek has known about the '209 patent since at least July 19, 2024, when Realtek again received notice of its infringement of the '209 patent via an email sent by Redwood to Gina Hung of Realtek. Realtek refused Redwood's notice letters delivered by FedEx and refused to respond to any of Redwood's emails.

179. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek 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 '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, Realtek does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '209 patent. Realtek 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.

180. On information and belief, despite having knowledge of the ’209 patent and its infringement, Defendant specifically intended for others to import and sell products accused of infringing the ’209 patent. For example, Defendant 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, Defendant 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 Realtek, its subsidiaries, distributors, downstream manufacturers that incorporate Realtek’s Accused Products into Wi-Fi products, and/or importers provide such instruction and/or encouragement. Further, on information and belief, Defendant’s 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.

181. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek’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, Realtek 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, Realtek 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.

182. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek'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, Realtek 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 Realtek 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, Realtek 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 Realtek 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. Realtek 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.

183. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek'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, Realtek 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, Realtek 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.

184. 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, Realtek has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Realtek'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.

185. Redwood has been damaged as a result of Realtek's infringing conduct described in this Count. Realtek is, thus, liable to Redwood in an amount that adequately compensates Redwood for Realtek'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)

186. Plaintiff incorporates paragraphs 1 through 185 herein by reference.

187. 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.

188. 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.

189. Realtek 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.

190. Realtek 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.

191. Furthermore, Realtek directly infringes the '574 patent through its direct involvement in the activities of its subsidiaries, including Cortina and Ubilinx. 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, Defendant is 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, Realtek and its subsidiaries and related companies are essentially the same company, and Realtek has 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, Realtek 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 Realtek'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).

192. For example, Realtek infringes claim 1 of the '574 patent via the Accused Products, including the RTL8812BU. The Accused Products, including the RTL8812BU, 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.realtek.com/Product/Index?id=576&cate_id=194 (RTL8812BU is compliant with IEEE 802.11n and IEEE 802.11ac. "The Realtek RTL8812BU-CG is a highly integrated single-chip that supports 2-stream 802.11ac solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) and Wireless LAN (WLAN) USB interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single chip.").

193. The Accused Products, including the RTL8812BU, 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.

194. The Accused Products, including the RTL8812BU, 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 +0.316 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.

195. The Accused Products, including the RTL8812BU, 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.

196. The Accused Products, including the RTL8812BU, 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.

197. The Accused Products, including the RTL8812BU, 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.

198. The Accused Products, including the RTL8812BU, 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.

199. The Accused Products, including the RTL8812BU, 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.

200. The Accused Products, including the RTL8812BU, 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 +0.316 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.

201. The Accused Products, including the RTL8812BU, 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.

202. The Accused Products, including the RTL8812BU, 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.

203. The Accused Products, including the RTL8812BU, 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.

204. The Accused Products, including the RTL8812BU, 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.

205. The specific ways in which the Accused Products, including the RTL8812BU, 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.

206. Furthermore, the Accused Products, including the RTL8812BU, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '574 patent.

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

208. 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.

209. 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.

210. 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.

211. 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.

212. 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.

213. At a minimum, Realtek has known of the ’574 patent at least as early as the filing date of the Complaint. In addition, Realtek has known about the ’574 patent since at least May 12, 2022, when Realtek received notice of its infringement of the ’574 patent via an email sent by Redwood to Sherry Chen of Realtek. The May 12, 2022 email also provided Realtek access to Redwood’s data room for the infringement chart of the ’574 patent, which provided further notice of Realtek’s infringement. The May 12, 2022 email also attached two notice letters regarding the ’574 patent originally sent to Realtek via FedEx on November 2, 2021 and December 8, 2021, where Realtek refused to accept delivery of the 2021 notice letters. On May 22, 2022, Redwood sent another notice letter via FedEx regarding Realtek’s infringement of the ’574 patent, where Realtek again refused to accept delivery of the 2022 notice letter. In addition, Realtek has known about the ’574 patent since at least September 15, 2023, when Realtek again received notice of its infringement of the ’574 patent via an email sent by Redwood to Alfred Kuo of Realtek. Furthermore, Realtek has known about the ’574 patent since at least July 19, 2024, when Realtek again received notice of its infringement of the ’574 patent via an email sent by Redwood to Gina Hung of Realtek. Realtek refused Redwood’s notice letters delivered by FedEx and refused to respond to any of Redwood’s emails.

214. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek 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, Realtek does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '574 patent. Realtek 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.

215. On information and belief, despite having knowledge of the '574 patent and its infringement, Defendant specifically intended for others to import and sell products accused of infringing the '574 patent. For example, Defendant 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, Defendant 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 Realtek, its subsidiaries, distributors, downstream manufacturers that incorporate Realtek's Accused Products into Wi-Fi products, and/or importers provide such instruction and/or encouragement. Further, on information and belief, Defendant's 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.

216. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek'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, Realtek 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, Realtek 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.

217. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek'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, Realtek 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 Realtek 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, Realtek 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 Realtek 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. Realtek 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.

218. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek'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, Realtek 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, Realtek 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.

219. 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, Realtek has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Realtek'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.

220. Redwood has been damaged as a result of Realtek's infringing conduct described in this Count. Realtek is, thus, liable to Redwood in an amount that adequately compensates Redwood for Realtek'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. 7,917,102)

221. Plaintiff incorporates paragraphs 1 through 220 herein by reference.

222. Redwood is the assignee of the '102 patent, entitled "Radio Transmitting Apparatus and Radio Transmission Method," with ownership of all substantial rights in the '102 patent,

including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

223. The ’102 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The ’102 patent issued from U.S. Patent Application No. 11/937,422.

224. Realtek has and continues to directly and/or indirectly infringe one or more claims of the ’102 patent in this judicial district and elsewhere in Texas and the United States.

225. Realtek directly infringes the ’102 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 ’102 patent.

226. Furthermore, Realtek directly infringes the ’102 patent through its direct involvement in the activities of its subsidiaries, including Cortina and Ubilinx. Such subsidiaries conduct activities that constitute direct infringement of the ’102 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 ’102 patent. Further, Defendant is 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, Realtek and its subsidiaries and related companies are essentially the same company, and Realtek has 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, Realtek 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 Realtek'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 '102 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).

227. For example, Realtek infringes claim 3 of the '102 patent via the Accused Products, including the RTL8812BU. The Accused Products, including the RTL8812BU, 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 radio transmitting apparatus that transmits a modulated signal. https://www.realtek.com/Product/Index?id=576&cate_id=194 (RTL8812BU is compliant with IEEE 802.11n and IEEE 802.11ac. "The Realtek RTL8812BU-CG is a highly integrated single-chip that supports 2-stream 802.11ac solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) and Wireless LAN (WLAN) USB interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single chip.").

228. The Accused Products, including the RTL8812BU, each comprise circuitry and/or components (hardware and/or software) that forms a transmission frame which includes a frequency offset estimation signal for estimating frequency offset of the modulated signal at a receiving apparatus, a channel fluctuation estimation signal for estimating channel fluctuation of the modulated signal at the receiving apparatus and a gain control signal for performing gain control of the modulated signal at the receiving apparatus. The Accused Products, including the RTL8812BU, must be configured to form the claimed "transmission frame" for a HT-mixed format PPDU frame, which is a mandatory feature of IEEE 802.11 2016. *See, e.g.*, Figure 19-1 of

IEEE 802.11 2016; https://www.albany.edu/faculty/dsaha/teach/2019Spring_CEN574/slides/08_WLAN.pdf at slides 67-68 (the HT-mixed format PPDU is mandatory). For example, the Accused Products, including the RTL8812BU s, each form a HT-mixed format PPDU frame, which comprises an L-LTF subframe, which is a frequency offset estimation signal. *See, e.g.*, Figures 17-4 and 19-1 of IEEE 802.11 2016. The HT-mixed format PPDU frame also comprises an HT-LTF subframe, which is a channel fluctuation estimation signal. *See, e.g.*, Figure 19-1 and Section 19.3.9.4.6 of IEEE 802.11 2016. The HT-mixed format PPDU frame also comprises an L-STF subframe, which is a gain control signal. *See, e.g.*, Figure 19-1 and Section 19.3.9.3.3 of IEEE 802.11 2016.

229. The Accused Products, including the RTL8812BU, each comprise circuitry and/or components (hardware and/or software) configured to transmit the transmission frame. For example, the Accused Products, including the RTL8812BU, must be configured to transmit a transmission frame for a HT-mixed format PPDU, which is a mandatory feature of IEEE 802.11 2016. *See, e.g.*, Figure 19-1 of IEEE 802.11 2016; https://www.albany.edu/faculty/dsaha/teach/2019Spring_CEN574/slides/08_WLAN.pdf at slides 67-68 (the HT-mixed format PPDU is mandatory).

230. The transmission frame includes a first gain control signal and a second gain control signal. For example, the HT-mixed format PPDU comprises a first gain control signal in the L-STF subframe and a second gain control signal in the HT-STF subframe. *See, e.g.*, Figure 19-1 and Sections 19.3.9.3.3 and 19.3.9.4.5 of IEEE 802.11 2016. The first gain control signal is arranged prior to the frequency offset estimation signal. For example, the L-STF subframe is arranged prior to the L-LTF subframe. *See, e.g.*, Figure 19-1 of IEEE 802.11 2016. The second gain control is arranged subsequent to the frequency offset estimation signal and prior to the

channel fluctuation estimation signal. For example, the HT-STF subframe is arranged subsequent to the L-LTF subframe and prior to the HT-LTF subframe. *See, e.g.*, Figure 19-1 of IEEE 802.11 2016.

231. The specific ways in which the Accused Products, including the RTL8812BU, are configured to support the aforementioned features of IEEE 802.11n and/or 802.11ac and/or 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 3 of the '102 patent.

232. Furthermore, the Accused Products, including the RTL8812BU, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 3 of the '102 patent.

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

234. The claims of the '102 patent are patent eligible under 35 U.S.C. § 101. The '102 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 "radio transmitting apparatus and radio transmission method that enable[s] reception quality to be improved by reducing pilot symbol and data symbol quantization error in a system in which the number of simultaneously transmitted modulated signals is changed according to the propagation environment and so forth." '102 patent, 2:12-18. The '102 patent provides the technical solution above, for example, by "changing the transmit power of the modulated signal transmitted from each antenna according to the number of antennas that simultaneously transmit modulated signals (that is, the number of modulated signals)." '102 patent, 2:19-22. That solution is reflected in the claims 1, 3, 5, and 10

of the ’102 patent, which include, for example, gain control limitations that can be used in the changing of the transmit power of the modulated signals. *See, e.g.*, ’102 patent, 17:34-50.

235. At a minimum, Realtek has known of the ’102 patent at least as early as the filing date of the Complaint. In addition, Realtek has known about the ’102 patent since at least May 12, 2022, when Realtek received notice of its infringement of the ’102 patent via an email sent by Redwood to Sherry Chen of Realtek. The May 12, 2022 email also provided Realtek access to Redwood’s data room for the infringement chart of the ’102 patent, which provided further notice of Realtek’s infringement. The May 12, 2022 email also attached two notice letters regarding the ’102 patent originally sent to Realtek via FedEx on November 2, 2021 and December 8, 2021, where Realtek refused to accept delivery of the 2021 notice letters. On May 22, 2022, Redwood sent another notice letter via FedEx regarding Realtek’s infringement of the ’102 patent, where Realtek again refused to accept delivery of the 2022 notice letter. In addition, Realtek has known about the ’102 patent since at least September 15, 2023, when Realtek again received notice of its infringement of the ’102 patent via an email sent by Redwood to Alfred Kuo of Realtek. Furthermore, Realtek has known about the ’102 patent since at least July 19, 2024, when Realtek again received notice of its infringement of the ’102 patent via an email sent by Redwood to Gina Hung of Realtek. Realtek refused Redwood’s notice letters delivered by FedEx and refused to respond to any of Redwood’s emails.

236. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek 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 ’102 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, Realtek does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '102 patent. Realtek 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.

237. On information and belief, despite having knowledge of the '102 patent and their infringement, Defendant specifically intended for others to import and sell products accused of infringing the '102 patent. For example, Defendant specifically intended for its U.S.-based subsidiaries, distributors, or customers to import and sell products accused of infringing the '102 patent. On information and belief, Defendant instructed and encouraged the importers to import and/or sell products accused of infringing the '102 patent. On information and belief, the purchase and sale agreements between Realtek, its subsidiaries, distributors, downstream manufacturers that incorporate Realtek's Accused Products into Wi-Fi products, and/or importers provide such instruction and/or encouragement. Further, on information and belief, Defendant's U.S.-based

subsidiaries, distributors, affiliates, employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the ’102 patent in the United States.

238. On information and belief, since at least the above-mentioned dates when Realtek was on notice of its infringement, Realtek’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 ’102 patent, constituting a material part of the invention. On information and belief, Realtek knows and has known the same to be especially made or especially adapted for use in an infringement of the ’102 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, Realtek 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 ’102 patent that are especially made or especially adapted for use in end user products that infringe the ’102 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 Realtek was on notice of its infringement, Realtek’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 ’102 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, Realtek 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 ’102 patent, where Realtek 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, Realtek 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 ’102 patent, where Realtek 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. Realtek 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 Realtek was on notice of its infringement, Realtek'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 '102 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, Realtek 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 '102 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, Realtek 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 '102 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 '102 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '102 patent, Realtek has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Realtek's infringing activities relative to the '102 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 Realtek's infringing conduct described in this Count. Realtek is, thus, liable to Redwood in an amount that adequately compensates Redwood for Realtek'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 Realtek the damages sustained by Plaintiff as a result of Realtek'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 Realtek, and that the Court grant Plaintiff the following relief:

1. A judgment that Realtek 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 Realtek;
3. A judgment and order requiring Realtek 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 Realtek 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 Realtek 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: March 25, 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