

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

REDWOOD TECHNOLOGIES, LLC,

Plaintiff,

v.

**NXP SEMICONDUCTORS N.V., NXP B.V., AND
NXP USA, INC.,**

Defendants.

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§ **JURY TRIAL DEMANDED**
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§ **C.A. NO. 6:24-cv-128**
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PLAINTIFF’S COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Redwood Technologies, LLC (“Redwood”) files this Complaint against Defendants NXP Semiconductors N.V., NXP B.V., and NXP USA, Inc. (collectively, “NXP” or “Defendants”) for infringement of U.S. Patent No. 7,359,457 (the “’457 patent”), U.S. Patent No. 7,460,485 (the “’485 patent”), U.S. Patent No. 7,826,555 (the “’555 patent”), U.S. Patent No. 7,983,140 (the “’140 patent”), U.S. Patent No. 8,218,501 (the “’501 patent”), U.S. Patent No. 9,374,209 (the “’209 patent”), and U.S. Patent No. 10,270,574 (the “’574 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, NXP Semiconductors N.V. (“NXP NV”) is a company organized and existing under the laws of the Netherlands, having a place of business at High Tech Campus 60, 5656 AG, Eindhoven, the Netherlands.

3. On information and belief, NXP B.V. (“NXP BV”) is a company organized and existing under the laws of the Netherlands, having a place of business at High Tech Campus 60, 5656 AG Eindhoven, the Netherlands. NXP BV is a wholly-owned and wholly-controlled subsidiary of NXP Semiconductors NV.

4. On information and belief, NXP USA, Inc. (“NXP USA”) is a corporation organized under the laws of Delaware. On information and belief, NXP USA is a wholly-owned and wholly-controlled subsidiary of NXP Semiconductors NV. NXP USA, Inc. has places of business in this District, including its U.S. Corporate Headquarters located at 6501 W. William Cannon Dr., Austin, TX 78735; and 3501 Ed Bluestein Blvd., Austin, TX 78721.

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

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

6. On information and belief, NXP NV and NXP BV maintain (and have maintained) a corporate presence in the United States via at least its U.S.-based sales and/or distribution subsidiaries and/or agents, including NXP USA.

7. On information and belief, NXP NV controls (and has controlled) NXP BV, as well as many other subsidiaries, including NXP USA. On information and belief, NXP USA and/or NXP BV provide (and have provided) sales, distribution, research, and/or development support in the United States for their parent NXP NV, which owns NXP BV and NXP USA. NXP BV and NXP USA are, and have been, agents of NXP NV. At the direction and control of NXP NV, its subsidiaries, including NXP BV, and/or U.S.-based sales and/or distribution subsidiaries including, NXP USA, have imported and continue to import Accused Products into the United States and this District.

8. On information and belief, NXP BV controls (and has controlled) many subsidiaries, including NXP USA. On information and belief, NXP USA provides (and has provided) sales, distribution, research, and/or development support in the United States for its parent NXP BV, which owns NXP USA. NXP USA is, and has been, an agent of NXP BV. At the direction and control of NXP BV, U.S.-based sales and/or distribution subsidiaries including, NXP USA, have imported and continue to import Accused Products into the United States and this District.

9. On information and belief NXP NV controls (and has controlled) each of NXP BV and NXP USA. On information and belief, each of these related companies and other NXP companies are, and have been, agents of NXP NV. For example, NXP NV, NXP BV, and NXP USA use the same logo, further emphasizing that these companies are alter egos and/or agents of one another.

10. On information and belief, NXP NV, NXP BV, and NXP USA, 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. NXP NV, NXP BV, and NXP USA operate (and have operated) in agency with one another and their respective foreign and U.S.-based subsidiaries, affiliates, distributors, retail partners, suppliers, and customers, to provide a distribution channel of infringing products within this District and the U.S. nationally. NXP NV, NXP BV, and NXP USA, 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, NXP NV, NXP BV, and NXP USA, including their respective U.S.-based subsidiaries, affiliates, distributors, retail partners, and customers (which act as part of a global network and supply chain of overseas sales and manufacturing subsidiaries), have operated as agents of one another and vicariously as parts of the same business group to work in concert together and enter into agreements that are nearer than arm's length. NXP NV, NXP BV, and NXP USA, and their U.S.-based sales subsidiaries, individually and/or in concert, conduct business (and have conducted business) in the United States, including importing, using, testing, distributing, offering to sell, and selling the Accused Products that incorporate devices, systems, and processes that infringed the Asserted Patents in Texas and this District. *See Trois v. Apple Tree Auction Center, Inc.*, 882 F.3d 485, 490 (5th Cir. 2018) (“A defendant may be subject to personal jurisdiction because of the activities of its agent within the forum state....”); *see also Cephalon, Inc. v. Watson Pharmaceuticals, Inc.*, 629 F. Supp. 2d 338, 348 (D. Del. 2009) (“The agency theory

may be applied not only to parents and subsidiaries, but also to companies that are ‘two arms of the same business group,’ operate in concert with each other, and enter into agreements with each other that are nearer than arm’s length.”).

13. Through offers to sell, sales, imports, distributions, and other related agreements to transfer ownership of Defendants’ Accused Products by and/or to affiliates, distributors, subsidiaries, suppliers, retail partners, customers, agents, and/or other Defendants, Defendants are operating in (and have operated in) and maintaining (and maintained) a significant business presence in the U.S. and/or through their U.S. subsidiaries or agents, Defendants do business in the U.S., the state of Texas, and in this District.

14. NXP NV, NXP BV, and NXP USA are companies which together comprise “a global semiconductor company and a long-standing supplier in the industry, with over 60 years of innovation and operating history.” *See* <https://investors.nxp.com/static-files/b8f7bcb5-5812-4709-aed4-f52d3d2a8eff> at page 3. According to NXP, it provides technology solutions “in the domains of cryptography-security, high-speed interface, radio frequency (RF), mixed-signal analog-digital (mixed A/D), power management, digital signal processing and embedded system design.” *Id.* NXP’s “product solutions are used in a wide range of end market applications including: automotive, industrial & Internet of Things (IoT), mobile, and communication infrastructure.” *Id.*

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

belief, Defendants share directors, executives, and employees. According to NXP, “NXP has one reportable segment representing the entity as a whole, which reflects the way in which our chief operating decision maker executes operating decisions, allocates resources, and manages the growth and profitability of the Company.” *See* <https://investors.nxp.com/static-files/b8f7bcb5-5812-4709-aed4-f52d3d2a8eff> at page 3; *see also id.* at page 8 (“We manage our manufacturing assets together through one centralized organization to ensure we realize scale benefits in asset utilization, purchasing volumes and overhead leverage across businesses.”).

16. NXP, as a single enterprise of multiple operating subsidiaries acting in consort with one another, has a common Board of Directors with responsibility “for the overall conduct of the NXP Group.” Rules Governing the Board of Directors of NXP Semiconductors N.V. (Aug. 2022) at Article 1.1. Annually, the common Board of Directors of the NXP Group sets “the corporate strategy of the NXP Group.” *Id.* at Article 1.3(b). The collective set of NXP entities, including Defendants, is managed, in consort, by a common management team to direct the manufacture, distribution, and sale of NXP products, including the Accused Products.

17. NXP USA is a subsidiary of both NXP NV and NXP BV and engages in sales, advertising, marketing, and/or research in the United States on behalf of, and under the control of NXP NV and NXP BV. “NXP owns and operates four wafer fabrication facilities in the US, two of which are in Austin, Texas The representative products of these fabs include microcontrollers (MCUs) and microprocessors (MPUs), power management devices, RF transceivers, amplifiers and sensors.” *See* <https://www.nxp.com/company/about-nxp/worldwide-locations/united-states:USA>.

18. NXP employs numerous employees in Austin who possess information relevant to issues involving the Accused Products, including at least: (1) Executive VP and CFO, who

possesses knowledge related to the revenue of the accused products; (2) Senior VP and Chief IP Officer, who possesses knowledge relevant to damages and the hypothetical negotiation; (3) Senior Director and Head of IP Monetization, who has submitted patents relevant to the Accused Products and possesses knowledge relevant to damages; (4) Executive VP, General Counsel, Corporate Secretary, and Chief Sustainability Officer, who would possess information relevant to damages and reasonable royalty analysis; (5) Executive VP, Global Operations, who is responsible for overseeing NXP's manufacturing operations and would have relevant knowledge on the manufacturing of the Accused Products; (6) NXP's global head of sales, who possesses relevant knowledge of the sales and marketing of the Accused Products; (7) Technical Director, who works on the Accused Products; (8)-(9) two Austin-based NXP employees who are responsible for design-engineering of the Accused Products; (10) an NXP employee who is responsible for managing the relationship with a third party that fabricates the Accused Products; (11) an NXP employee who manages NXP's public relations and worked on the marketing of one or more Accused Products; (12) Senior Manager of Product Marketing; (13) employees in NXP's i.MX 8M evaluation kit group, who are responsible for ensuring software drivers in the Accused Products are compatible with an i.MX 8M Quad multimedia processor unit; and (14) an employee in NXP's sales organization who works with the Wireless Connectivity Solution Group responsible for the Accused Products. *See MIMO RESEARCH, LLC v. NXP USA, Inc.*, No. W:22-CV-00501-ADA (W.D. Tex. Apr. 20, 2023), Dkt. 71 at pp. 9-10.

19. NXP has posted 56 job listings in Austin that are related to the research, development, manufacturing, sales, testing, and/or marketing of the Accused Products. *See* <https://nxp.wd3.myworkdayjobs.com/careers?locations=3db468d56aa610d690867492f6a44a10&locations=3db468d56aa610d6908623b4269049aa> (exemplary NXP job titles in Austin include

Sr Director, SoC Design; Senior Verification Engineer; Senior Principal Verification Engineer; SoC Hardware Architect; Software Enablement Technical Marketing Manager; Entry Level Product/Test Engineers; Internships in Product/Test Engineering; IoT Segment Product Line Manager; Product Marketing; Systems Architecture and Design Leader/Fellow Microprocessors and Microcontrollers; Director, and IP Design Engineering.).

20. NXP owns, manages, and/or operates a highly interactive website at <https://www.nxp.com/>. NXP BV is listed as the registrant, administrative contact, and technical contact for the NXP.com website. *See* <https://lookup.icann.org/en/lookup>.

21. The "Privacy Statement" webpage on the NXP.com website states that "When this Privacy Statement refers to 'we', ' us' or 'our', it refers to NXP B.V. and affiliates or subsidiaries which under this Privacy Statement may act as a controller of your personal information" *See* <https://www.nxp.com/pages/privacy-statement:PRIVACYPRACTICES>. Furthermore, the Privacy Statement also provides contact details for questions regarding the Privacy Statement to be addressed to NXP Semiconductors N.V., Attn. Data Protection Office, High Tech Campus 60, 5656AG Eindhoven, The Netherlands. *Id.* A link to this Privacy Statement is included on all webpages of the NXP.com website.

22. From the NXP.com website, customers and end users in the United States can purchase NXP products including but not limited to the Accused Products. *See* <https://www.nxp.com/support/sample-and-buy:SAMPLE-BUY> ("Whether you prefer to purchase direct from us or use your preferred distributor you'll find quantities and pricing for all our NXP and third-party products.") NXP explains, "Through our online catalog and shopping cart, you can quickly and easily buy parts, software, development tools or third-party products that have a "Buy from NXP" button Buy from NXP next to them. Simply click the button to add the product to your

cart and then make your purchase using major credit cards, wire transfers or purchase orders. Items can be shipped to virtually anywhere in the world.” See https://www.nxp.com/support/sample-and-buy/buy-from-nxp:WTOBUY_BUYDIRECT.

23. The NXP.com website offers extensive and interactive training for customers and end users on the design and use of NXP products, including the Accused Products. <https://www.nxp.com/support/support/training:TRAINING-EVENTS>.

24. The NXP.com website provides customers, potential customers, and/or end users located in the United States or elsewhere with real-time, interactive support and guidance on the use of NXP products, including but not limited to the Accused Products. <https://www.nxp.com/support/support:SUPPORTHOME>. For example, customers, potential customers, and/or end users can interact with the NXP.com website to provide support and guidance as to NXP products, including the Accused Products. *Id.* Such interaction provided by the NXP.com website includes participating in an open forum for technical discussions moderated by NXP experts; requesting confidential assistance with an NXP support professional through support tickets; or participating in a live chat with NXP employees. *Id.*

25. NXP provides additional interactivity for those customers and end users who create an account on the NXP.com website. For the website users with an NXP.com account, NXP offers: Access to our full public library of technical content, including documentation, training, and software via collections; Access authorized secure information about our products. Apply online for an NDA with NXP to get started; Engage with a vibrant and active ecosystem of engineers and specialists in the NXP Community; Get timely and confidential world-class assistance from an NXP Support Professional; Queue up multiple documents or items to download when it's easiest for you using the download manager; and Get the first notification about new NXP products and

services via our newsletter. <https://www.nxp.com/support/support/my-nxp-account-benefits/my-nxp-account-faqs:NXP-ACCOUNT-FAQS>.

26. NXP encourages and rewards active engagement on the NXP.com website by NXP customers and end users. For example, NXP.com users can earn badges and rewards. <https://www.nxp.com/support/support/my-nxp-account-benefits:NXP-ACCOUNT-BENEFITS>.

27. NXP is willing to share "Proprietary or Confidential Information" with those customers and end users who create an account on the NXP.com website and complete a Non-Disclosure Agreement with NXP. <https://www.nxp.com/support/support/non-disclosure-agreement-faqs:NDA-FAQS>. The NXP.com website permits users to "Apply for an NDA with NXP" directly through the NXP.com website. *Id.* The website also includes a "Sample Letter," which provides a template for an NDA between an NXP.com website user and an NXP entity to be filled in by an NXP employee. *Id.*

28. Prior to the filing of the Complaint, Redwood sent a letter received by NXP on November 8, 2021, where Redwood attempted to engage NXP in licensing discussions related to the Asserted Patents for reasonable and non-discriminatory terms for a license to be taken in the absence of litigation. Indeed, NXP has known about each of the Asserted Patents since at least November 8, 2021, when NXP received notice of its infringement of the Asserted Patents via the letter sent by Redwood.

29. Prior to the filing of the Complaint, Redwood sent several emails to NXP, including an email received by NXP on January 24, 2022, where Redwood again attempted to engage NXP in licensing discussions related to the Asserted Patents for reasonable and non-discriminatory terms for a license to be taken in the absence of litigation. Indeed, NXP has known about each of the Asserted Patents since at least May 12, 2022 when NXP received the second notice of its

infringement of the Asserted Patents via email where Redwood again attempted to engage NXP 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.

30. To date, NXP has not agreed to license the Asserted Patents for reasonable and non-discriminatory terms. On January 24, 2022, NXP stated that it was declining to access or review any Redwood documents or otherwise engage in any licensing dialogue with Redwood. Redwood's readiness to continue with negotiations. On that same day, Redwood emailed NXP notifying NXP that Redwood considered any RAND obligations to the IEEE fulfilled because of NXP's apparent refusal to engage in any licensing dialogue where Redwood advised NXP that Redwood's offer would be valid for 30 days. On July 31, 2023, Redwood offered NXP a last opportunity to discuss licensing as a prelitigation resolution. On December 13, 2023, Redwood made yet another offer to license the Asserted Patents to NXP for reasonable and non-discriminatory terms. NXP declined this offer on January 16, 2024 and refused to make a counteroffer.

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

32. NXP'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.

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

34. On information and belief, NXP NV, NXP BV, and NXP USA operate as a unitary business venture and are jointly and severally liable for the acts of patent infringement alleged herein.

JURISDICTION AND VENUE

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

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

37. With respect to NXP NV and NXP BV (the “foreign Defendants”), venue is proper in this District pursuant to 28 U.S.C. § 1391(c). The foreign Defendants are foreign entities and may be sued in any judicial district under 28 U.S.C. § 1391(c)(3).

38. With respect to NXP USA, venue is proper in this District under 28 U.S.C. § 1400(b). NXP USA has committed acts of infringement in the District and/or has induced acts of patent infringement by others in this District and has a regular and established place of business within the District. For example, NXP USA has regular and established places of businesses within

this District including its U.S. Corporate Headquarters located at 6501 W. William Cannon Dr., Austin, TX 78735; and 3501 Ed Bluestein Blvd., Austin, TX 78721.

39. This Court has general and specific personal jurisdiction over the Defendants pursuant to due process and/or the Texas Long Arm Statute because, inter alia, (i) the Defendants have done and continue to do business in Texas and/or (ii) the Defendants have, directly and through intermediaries, distributors, agents, and/or others committed and continue 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 (including acts of infringement via NXP.com's highly interactive website) and/or sales via retail and wholesale stores, inducing others to commit acts of patent infringement in Texas (including inducement via NXP.com's highly interactive website), and/or committing a least a portion of any other infringements alleged herein. Defendants have placed, and are 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. Defendants have derived substantial revenues from their infringing acts occurring within Texas and within this District. Defendants have substantial business in this State and District (including, as relevant, in the past), including: (A) conducting at least part of their 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 their respective alter egos, intermediaries, agents, distributors, importers, customers, subsidiaries, and/or consumers.

40. This Court has personal jurisdiction over Defendants, directly or through intermediaries, distributors, importers, customers, subsidiaries, and/or consumers including their U.S.-based sales subsidiaries, as applicable. Through direction and control (including, as relevant, in the past) of such subsidiaries, affiliates, distributors, retail partners, agents, and/or customers, Defendants have 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 Defendants would not offend traditional notions of fair play and substantial justice. Upon information and belief, Defendants compensate their U.S.-based subsidiaries and/or agents for their sales support services in the United States. As such, Defendants have a direct financial interest in their U.S.-based subsidiaries and/or agents, and vice versa.

41. Personal jurisdiction is proper because Defendants have committed acts of infringement in this District. This Court has personal jurisdiction over Defendants because, inter alia, this action arises from activities Defendants purposefully directed towards the State of Texas and this District (including Defendants' activities via NXP.com's highly interactive website).

42. On information and belief, NXP (directly and/or through its subsidiaries, affiliates, or intermediaries) owns, operates, or controls facilities that include offices and fabrication facilities in Austin, Texas where infringing products are designed, developed, manufactured, tested, used, marketed, imported, exported, offered for sale, and/or sold into a stream of commerce that includes this District. On information and belief, NXP employs over 1800 employees in the Austin area.

See <https://www.linkedin.com/company/nxp-semiconductors/people/?facetGeoRegion=90000064>.

43. Exercising personal jurisdiction over Defendants in this District would not be unreasonable given Defendants' 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.

44. In addition, Defendants, as applicable, have 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, and/or 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 (including such activities provided via Defendants' NXP.com website).

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

46. Personal jurisdiction also exists specifically because Defendants and/or their U.S.-based subsidiaries, as applicable, have overlapping executives, interlocking corporate structures, and close relationships as manufacturer, importer, distributor, and/or seller of the products accused of infringement.

47. To the extent the foreign Defendants are not subject to jurisdiction in any state's court of general jurisdiction, exercising jurisdiction over the foreign Defendants 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.

48. In addition, Defendants, directly or through other Defendants, 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.

49. Defendants have advertised their infringing products to customers in Texas and this District through their NXP.com website.

50. On information and belief, the foreign Defendants control (or have controlled) or otherwise direct (or directed) and authorize (or authorized) all activities of their U.S.-based agents and/or sales and/or distribution subsidiaries, as applicable. Such directed and authorized activities include the U.S.-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. The foreign Defendants' U.S.-based sales and/or distribution subsidiaries and/or agents were authorized to import, distribute, sell, or offer for sale the Accused Products on behalf of the foreign Defendants. For example, the foreign Defendants researched, designed, developed, and manufactured the Accused Products, and then directed their U.S.-based sales subsidiaries, distributors, agents, and others to import, distribute, offer for sale, 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, Defendants conducted infringing activities, and the foreign

Defendants' U.S.-based sales subsidiaries and/or distributors and/or agents conducted infringing activities on behalf of the foreign Defendants.

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

52. Via Defendants' alter egos, agents, intermediaries, distributors, importers, customers, subsidiaries, and/or consumers that maintained a business presence, operating in, and/or residing in the U.S., Defendants' 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)).

53. On information and belief, Defendants have placed infringing products and/or products that practiced infringing processes into the stream of commerce via established distribution channels comprising at least their subsidiaries, 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, Defendants have, vicariously through and/or in concert with other Defendants, 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.

54. In the alternative, the Court has personal jurisdiction over the foreign Defendants under Federal Rule of Civil Procedure 4(k)(2), because the claims for patent infringement in this action arise under federal law, foreign Defendants are not subject to the jurisdiction of the courts of general jurisdiction of any state and exercising jurisdiction over the foreign Defendants is consistent with the U.S. Constitution.

55. The foreign Defendants have minimum contacts with the United States. The foreign Defendants offer their stock on the NASDAQ. Furthermore, the foreign Defendants have purposefully targeted the U.S. market and this District as to the Accused Products by acquiring U.S. companies as evidenced by NXP's merger with Freescale Semiconductor, Ltd. in 2015 and NXP's acquisition of Marvell's Wi-Fi Connectivity Business in 2019. Additionally, the foreign Defendants purposefully target U.S. users of their NXP.com website to: gather privacy information; provide instruction materials, training, support, and user guides of NXP products, including the Accused Products; and/or offer for sale, ship, distribute, import, and/or sell NXP

products, including the Accused Products, directly from NXP or via its distributors or intermediaries.

56. With respect to the '457 patent and '140 patent, the Accused Products are devices that include, but are not limited to, NXP's devices and third party devices that include one or more of NXP's devices that are compliant with IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax (*e.g.*, the 88MW30X, 88MW32X, 88W8964, 88W9064, CW641, 88W8887, 88W8977, 88W8897, 88W8987, 88W9098, 88W8997, 88W8801, IW416, IW611, IW612, IW620, RW612, RW610, 88MW320/322, AW693, AW611, AW690, 88Q9098, 88Q9098S, 88W8987, W8987, 88W8887, and 88W8897P 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, NXP's devices and third party devices that include one or more of NXP's devices that are compliant with IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax (*e.g.*, the 88W8964, 88W9064, CW641, 88W8897, 88W9098, 88W8997, IW620, 88Q9098, and 88Q9098S 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, NXP's devices and third party devices that include one or more of NXP's devices that are compliant with Wi-Fi Multimedia ("WMM") (*e.g.*, the 88MW30X, 88MW32X, 88W8964, 88W9064, CW641, 88W8887, 88W8977, 88W8897, 88W8987, 88W9098, 88W8997, 88W8801, IW416, IW611, IW612, IW620, RW612, RW610, 88MW320/322, AW693, AW611, AW690, 88Q9098, 88Q9098S, 88W8987, W8987, 88W8887, and 88W8897P series), as well as, their components (*e.g.*, hardware, software, and/or firmware), and processes related to the same. With respect to the '501 patent, the Accused Products are devices that include, but are not limited to,

NXP's devices and third party devices that include one or more of NXP's devices that are compliant with IEEE 802.11r (e.g., the 88W8987, 88W9098, 88W8997, 88W8801, IW416, IW611, and IW612 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)

57. Plaintiff incorporates paragraphs 1 through 56 herein by reference.

58. 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.

59. 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.

60. NXP 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.

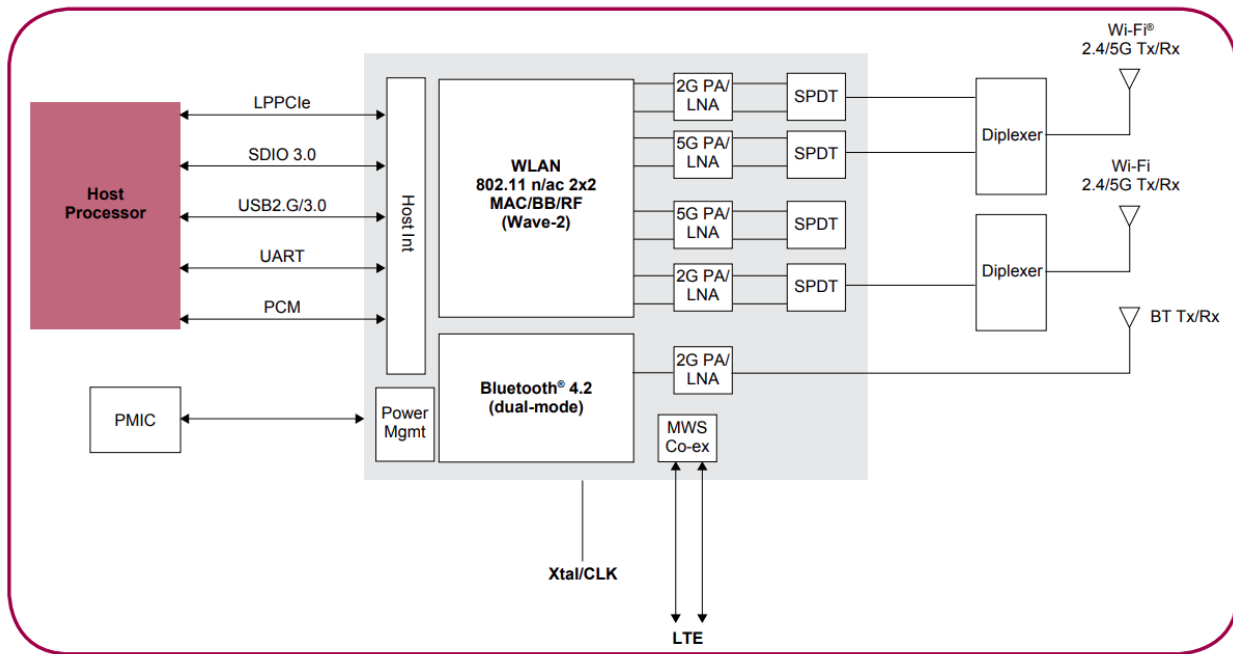
61. NXP directly infringes the '457 patent via 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '457 patent.

62. Furthermore, NXP NV directly infringes the '457 patent through its direct involvement in the activities of its subsidiaries, including NXP BV and NXP USA. Similarly, NXP

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

BV directly infringes the '457 patent through its direct involvement in the activities of its subsidiaries, including NXP USA. Such subsidiaries conduct activities that constitute direct infringement of the '457 patent under 35 U.S.C. § 271(a) by making, using, testing, offering for sale, selling, and/or importing those Accused Products, their components and processes, and/or products containing the same that incorporated the fundamental technologies covered by the '457 patent. Further, Defendants are vicariously liable for this infringing conduct of its subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, NXP NV, NXP BV, and NXP USA, and their subsidiaries and related companies are essentially the same company, and NXP NV and/or NXP BV have the right and ability to control their subsidiaries infringing acts and receive a direct financial benefit from the infringement of its subsidiaries. Furthermore, on information and belief, NXP 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 NXP'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).

63. For example, NXP infringes claim 1 of the '457 patent via the Accused Products, including the 88W8997 series. The Accused Products, including the 88W8997 series, each are compliant with IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax, and each comprise a transmission apparatus of claim 1. *See, e.g.,* <https://www.nxp.com/docs/en/fact-sheet/88W8997-FACT-SHEET.pdf>.

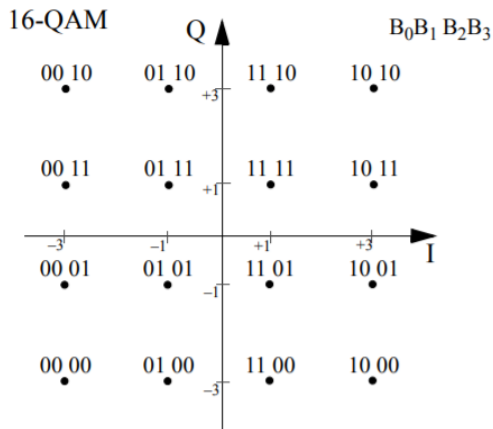
88W8997 BLOCK DIAGRAM

Id.

64. The Accused Products, including the 88W8997 series, each comprise circuitry and/or components (hardware and/or software) that determine a modulation system from among a plurality of modulation systems based on a communication situation. For example, the Accused Products utilize a Modulation and Coding Scheme (MCS) value that is used to determine the modulation, coding, and number of spatial channels based on information associated with a channel quality assessment. *See, e.g.*, Sections 19.3.5 and 19.3.13.4 of Part 11: Wireless LAN Medium Access Control (MAC) and Physical (PHY) Specifications of IEEE Std 802.11™ -2016 (“IEEE 802.11 2016”). Based on the results of the channel quality assessment, the Accused Products select an appropriate MCS value from a plurality of MCS values. *See, e.g.*, Section 19.3.5 and Table 19-27 of IEEE 802.11 2016.

65. The Accused Products, including the 88W8997 series, each comprise circuitry and/or components (hardware and/or software) that modulate a digital transmission signal according to the modulation system previously determined and generates a first symbol. The first

symbol comprises a first quadrature baseband signal. For example, the Accused Products, including the 88W8997 series, generate a first data symbol (e.g., Data), comprising a first quadrature baseband signal (e.g., an OFDM signal before up-conversion to the carrier frequency), that is modulated according to the MCS value. See, e.g., Section 19.3.5 and Figures 19-1 and 19-22 of IEEE 802.11 2016. The signal is a quadrature signal, in that it is expressed as a combination of sine and cosine waveforms. For example, when the 16-QAM modulation scheme is used, the following equation and constellation diagram are used to express the signal as a quadrature signal:



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

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

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

where

f_c is the center frequency of the carrier

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

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

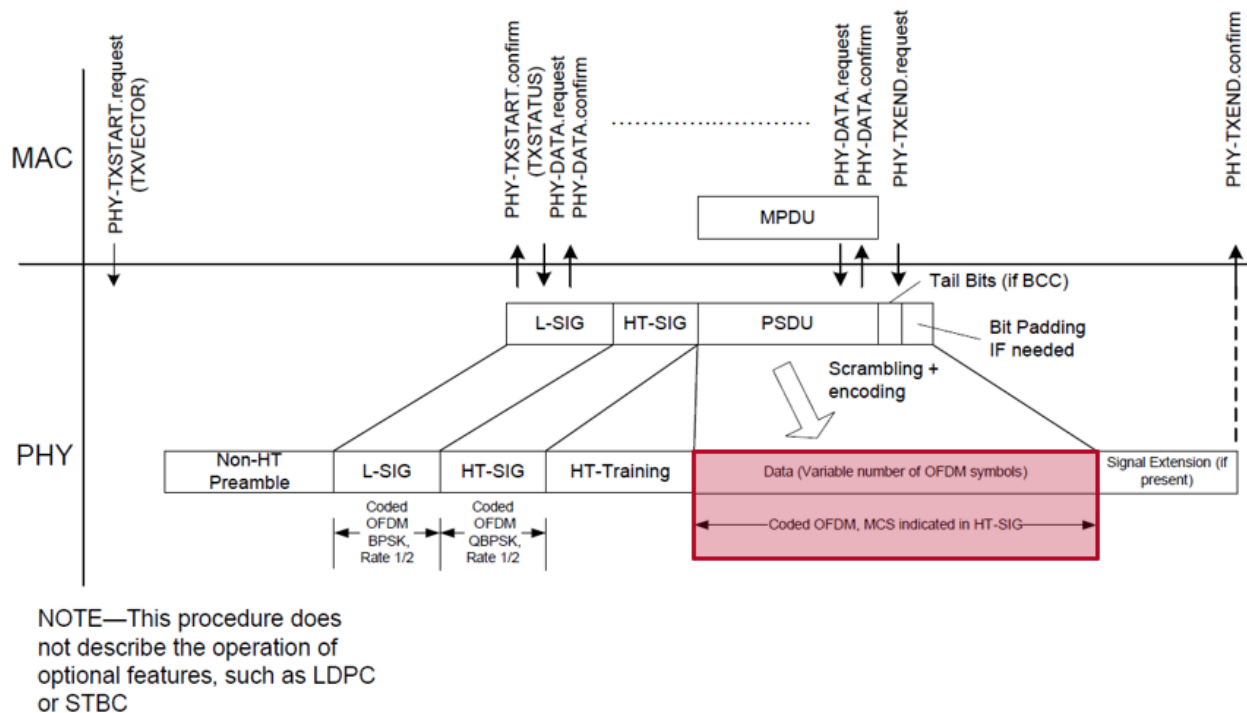


Figure 19-22—PHY transmit procedure (HT-mixed format PPDU)

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

66. 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 88W8997 series, must be configured pursuant to Figures 19-1 and 19-22, as described above.

67. The Accused Products, including the 88W8997 series, each comprise circuitry and/or components (hardware and/or software) that modulates the digital signal according to a predetermined modulation system and generates a second symbol. The second symbol comprises a second quadrature baseband signal. For example, the Accused Products, including the 88W8997 series, generate a second data symbol (e.g., the HT-SIG), comprising a second quadrature baseband signal (e.g., OFDM signal before up-conversion to the carrier frequency), that is modulated according to a predetermined modulation system (e.g., QBPSK). See, e.g., Section 19.3.9.4.3 and Figures 19-1 and 19-22 of IEEE 802.11 2016. The signal is a quadrature signal, in that it is expressed as a combination of sine and cosine waveforms. For example, when the QBPSK modulation scheme is used, the following constellation diagram is used to express the signal as a quadrature signal:

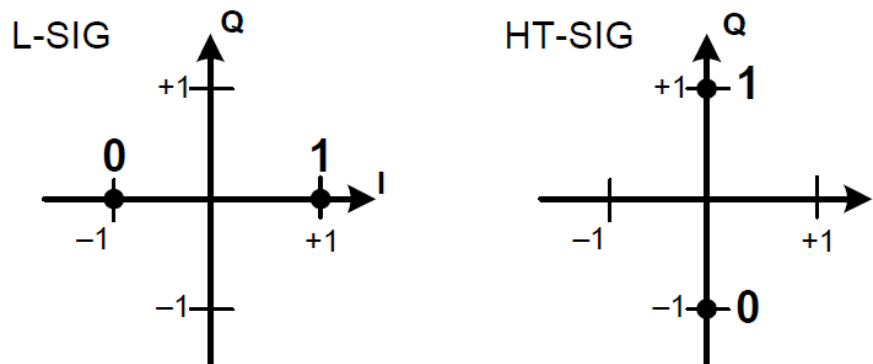


Figure 19-7—Data tone constellations in an HT-mixed format PPDU

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

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

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

where

f_c is the center frequency of the carrier

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

68. The specific ways in which the Accused Products, including the 88W8997 series, are configured to support the aforementioned features of IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax are further detailed in confidential documents and/or source code that evidence infringement by the Accused Products, including the 88W8997 series, as to at least Claim 1 of the '457 patent.

69. Furthermore, the Accused Products, including the 88W8997 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '457 patent.

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

71. 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.

72. At a minimum, NXP NV, NXP BV, and NXP USA have known of the ’457 patent at least as early as the filing date of the Complaint. In addition, NXP NV, NXP BV, and NXP USA have known about the ’457 patent since at least November 8, 2021, when NXP NV and NXP USA received notice of their infringement of the ’457 patent via a letter, and at least by November 20, 2021 when an agent for NXP USA replied to the letter. On January 24, 2022, NXP NV, NXP BV, and NXP USA received further notice of their infringement of the ’457 patent when Redwood provided an infringement chart of the ’457 patent to an agent for NXP USA via a data room accessible by NXP. An agent for NXP USA stated that it was refusing to access or review documents provided by Redwood, including the infringement chart of the ’457 patent provided by Redwood via the data room. Furthermore, NXP NV, NXP BV, and NXP USA have known about the ’457 patent since at least May 12, 2022, when an agent for NXP USA received further notice of their infringement via email. Indeed, the agent for NXP USA, Mikhail Lotvin, who received the aforementioned notices also identifies as an agent for NXP NV, where his LinkedIn profile identifies his role as Senior Counsel at NXP Semiconductors since 2012 and the LinkedIn page for NXP Semiconductors identifies itself as NXP Semiconductors N.V. *See* <https://www.linkedin.com/in/mikhail-lotvin-42804626/>; and

<https://www.linkedin.com/company/nxp-semiconductors/>. On information and belief, NXP USA is an agent and alter ego of NXP NV and NXP BV. Based on information and belief, NXP NV and NXP BV were on notice of the '457 patent from at least the foregoing dates that NXP USA was on notice of the '457 patent as a result of receiving actual or constructive notice from NXP USA, which is owned and controlled by its parents NXP NV and NXP BV.²

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

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

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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

74. On information and belief, despite having knowledge of the '457 patent and their infringement, Defendants specifically intended for others to import and sell products accused of infringing the '457 patent. For example, Defendants specifically intended for its U.S.-based subsidiaries or customers to import and sell products accused of infringing the '457 patent. On information and belief, Defendants instructed and encouraged the importers to import and/or sell products accused of infringing the '457 patent. On information and belief, the purchase and sale agreements between NXP NV, NXP BV, and NXP USA and the importers provide such instruction and/or encouragement. Further, on information and belief, Defendants' U.S.-based subsidiaries, affiliates, employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the '457 patent in the United States. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

75. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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, NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

76. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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 NXP 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, NXP 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 NXP 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. NXP 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. *See, e.g.,*

<https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE;>
[https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540.](https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540)

77. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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, NXP 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. *See, e.g.,* <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE;>
[https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540.](https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540)

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

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

80. Plaintiff incorporates paragraphs 1 through 79 herein by reference.

81. 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.

82. 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.

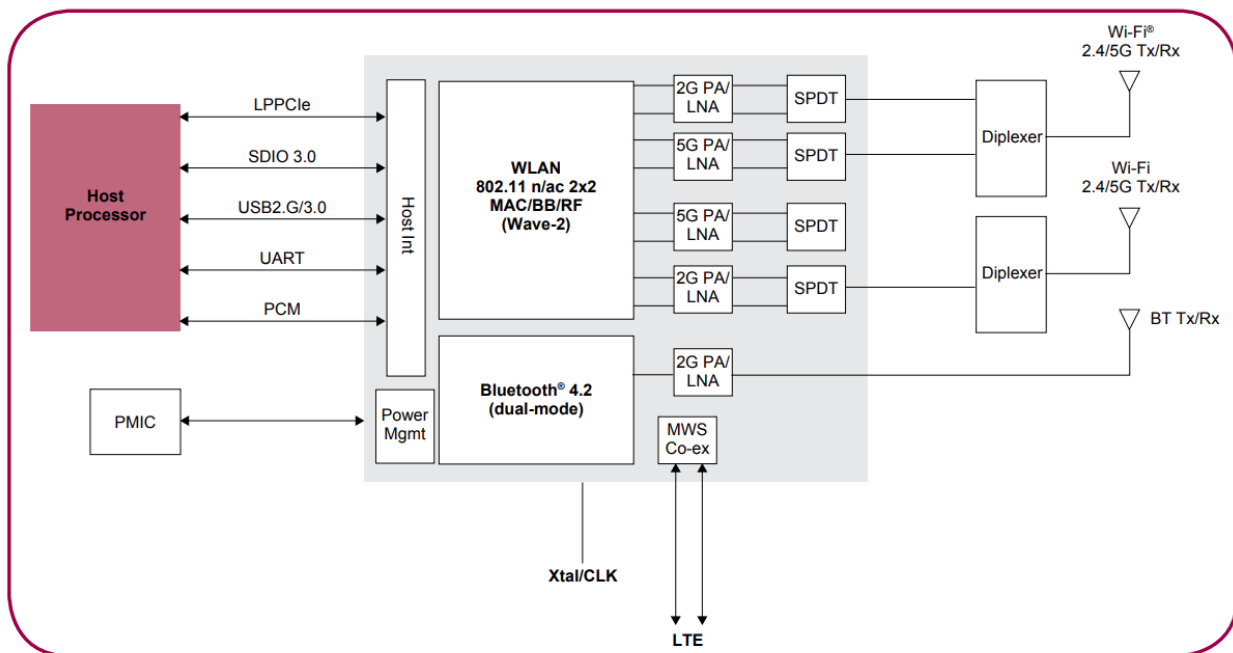
83. NXP has and continues to directly and/or indirectly infringe one or more claims of the ’485 patent in this judicial district and elsewhere in Texas and the United States.

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

85. Furthermore, NXP NV directly infringes the ’485 patent through its direct involvement in the activities of its subsidiaries, including NXP BV and NXP USA. Similarly, NXP BV directly infringes the ’485 patent through its direct involvement in the activities of its subsidiaries, including NXP USA. Such subsidiaries conduct activities that constitute direct infringement of the ’485 patent under 35 U.S.C. § 271(a) by using and/or testing those Accused Products, their components and processes, and/or products containing the same that incorporated the fundamental technologies covered by the ’485 patent. Further, Defendants are vicariously liable for this infringing conduct of their respective subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, NXP NV, NXP BV, NXP

USA, and their subsidiaries and related companies are essentially the same company, and NXP NV and/or NXP BV have the right and ability to control their subsidiaries infringing acts and receive a direct financial benefit from the infringement of its subsidiaries. Furthermore, on information and belief, NXP 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 NXP'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 '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).

86. NXP infringes claim 1 of the '485 patent via the Accused Products, including the 88W8997 series. The Accused Products, including the 88W8997 series, are compliant with the Wi-Fi Alliance WMM requirements. *See, e.g.,* https://www.nxp.com/docs/en/release-note/L5.10.72_2.2.0_WIFI-Doc.pdf at p. 10 (compliance with WMM (Wireless Multi-Media)). The Accused Products, including the 88W8997 series, perform a method for guaranteeing a quality of service (QoS) in delivering real-time data across a transmission medium. *See, e.g.,* Section 4.3.10 of Part 11: Wireless LAN Medium Access Control (MAC) and Physical (PHY) Specifications of IEEE Std 802.11™ -2016 ("IEEE 802.11 2016"); Section 1.0 of the Wi-Fi Alliance Wi-Fi Multimedia Technical Specification, Version 1.2.0 ("WMM Specification V1.2.0"); and <https://www.nxp.com/docs/en/fact-sheet/88W8997-FACT-SHEET.pdf>.

88W8997 BLOCK DIAGRAM

Id.

87. The Accused Products, including the 88W8997 series, each specify a traffic requirement for a traffic stream in accordance with a generic first specification. For example, the Accused Products utilize the traffic specification (“TSPEC”) element, which is a traffic requirement for a traffic stream based on QoS parameters for a particular Wi-Fi station (“STA”). *See, e.g.*, Section 9.4.2.30 of IEEE 802.11 2016 and Figure 14 of the WMM Specification V1.2.0.

88. The Accused Products, including the 88W8997 series, each transform the specified traffic requirement in accordance with a generic second specification based on the specified traffic requirement, an overhead requirement for the traffic stream and a condition of the transmission medium. For example, the Accused Products receive the TSPEC from an STA, and the Accused Products transform the TSPEC into medium time. *See, e.g.*, Section 3.5.2 of the WMM Specification V1.2.0. Medium Time is a traffic stream requirement utilized by the Accused Products which takes into consideration elements from the TSPEC, overhead requirements, and

expected error performance on the medium. *See, e.g.*, Section K.4.1 of IEEE 802.11 2016 and A.3 of the WMM Specification V1.2.0.

89. The Accused Products, including the 88W8997 series, each adjust the generic second specification based on feedback obtained from monitoring the condition of the transmission medium. For example, the Accused Products adjust the medium time with the receipt of each new TSPEC. *See, e.g.*, Sections 3.5.1 and 3.5.3 of the WMM Specification V1.2.0.

90. The Accused Products, including the 88W8997 series, each aggregate a plurality of specifications for a plurality of traffic streams into a single specification to reduce resources required to maintain and process the plurality of specifications and overhead incurred in medium dedication. For example, the Accused Products aggregate the mean data rate and burst size for a plurality of traffic streams to generate a single token bucket specification, which allows the Accused Products to manage the STA's admitted flows more effectively. *See, e.g.*, Section 3.5.1 of the WMM Specification V1.2.0.

91. The Accused Products, including the 88W8997 series, each perform medium dedication in accordance with the medium dedication schedule to coordinate transmission of the plurality of traffic streams. For example, the Accused Products perform the medium dedication according to the schedule to coordinate transmission between a plurality of STAs with admitted traffic streams. *See, e.g.*, Section 3.5.2 of the WMM Specification V1.2.0.

92. The specific ways in which the Accused Products, including the 88W8997 series, are configured to support the aforementioned features of WMM are further detailed in confidential documents and/or source code that evidence infringement by the Accused Products, including the 88W8997 series, as to Claim 1 of the '485 patent.

93. Furthermore, the Accused Products, including the 88W8997 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '485 patent.

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

95. 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.

96. At a minimum, NXP NV, NXP BV, and NXP USA have known of the '485 patent at least as early as the filing date of the Complaint. In addition, NXP NV, NXP BV, and NXP USA have known about the '485 patent since at least November 8, 2021, when NXP NV and NXP USA

received notice of their infringement of the '485 patent via a letter, and at least by November 20, 2021 when an agent for NXP USA replied to the letter. On January 24, 2022, NXP NV, NXP BV, and NXP USA received further notice of their infringement of the '485 patent when Redwood provided an infringement chart of the '485 patent to an agent for NXP USA via a data room accessible by NXP. An agent for NXP USA stated that it was refusing to access or review documents provided by Redwood, including the infringement chart of the '485 patent provided by Redwood via the data room. Furthermore, NXP NV, NXP BV, and NXP USA have known about the '485 patent since at least May 12, 2022, when an agent for NXP USA received further notice of their infringement via email. Indeed, the agent for NXP USA, Mikhail Lotvin, who received the aforementioned notices also identifies as an agent for NXP NV, where his LinkedIn profile identifies his role as Senior Counsel at NXP Semiconductors since 2012 and the LinkedIn page for NXP Semiconductors identifies itself as NXP Semiconductors N.V. *See* <https://www.linkedin.com/in/mikhail-lotvin-42804626/>; and <https://www.linkedin.com/company/nxp-semiconductors/>. On information and belief, NXP USA is an agent and alter ego of NXP NV and NXP BV. Based on information and belief, NXP NV and NXP BV were on notice of the '485 patent from at least the foregoing dates that NXP USA was on notice of the '485 patent as a result of receiving actual or constructive notice from NXP USA, which is owned and controlled by its parents NXP NV and NXP BV.³

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

³ *See* FN 2, *supra*.

Accused Products. Since at least the notice provided on the above-mentioned dates, NXP does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '485 patent. NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

98. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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 NXP 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, NXP 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. *See, e.g.,* <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

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

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

for NXP'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)

101. Plaintiff incorporates paragraphs 1 through 100 herein by reference.

102. 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.

103. 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.

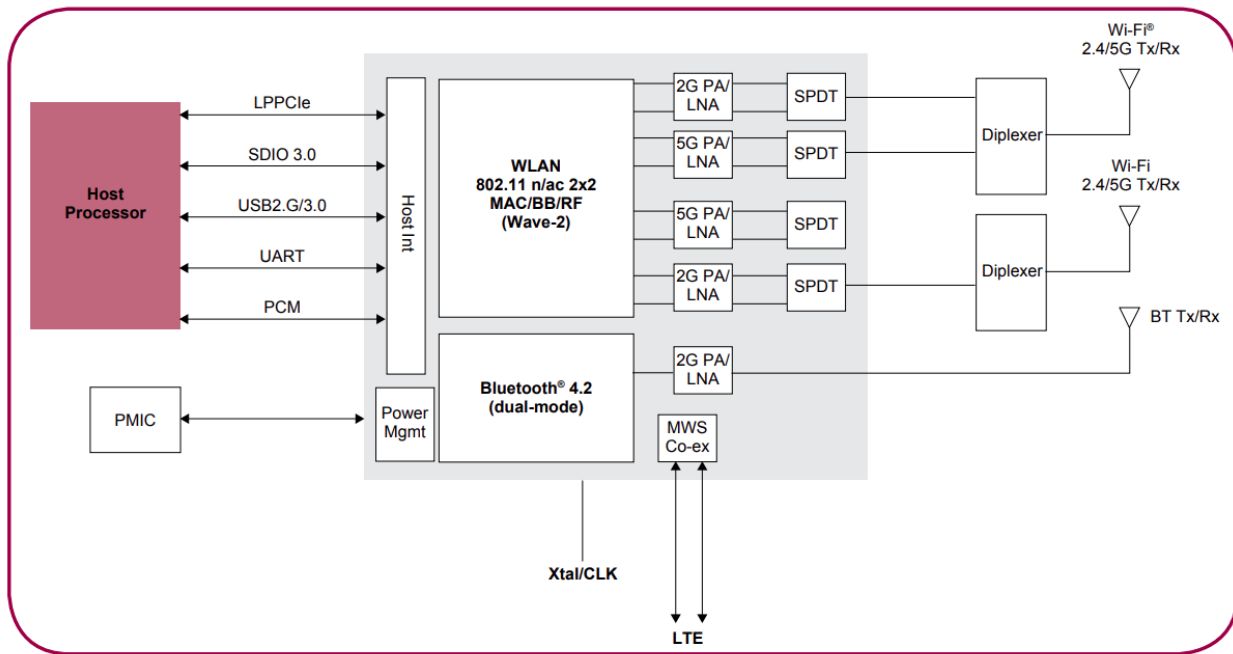
104. NXP has and continues to directly and/or indirectly infringe one or more claims of the '555 patent in this judicial district and elsewhere in Texas and the United States.

105. NXP 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.

106. Furthermore, NXP NV directly infringes the '555 patent through its direct involvement in the activities of its subsidiaries, including NXP BV and NXP USA. Similarly, NXP BV directly infringes the '555 patent through its direct involvement in the activities of its subsidiaries, including NXP USA. Such subsidiaries conduct activities that constitute direct infringement of the '555 patent under 35 U.S.C. § 271(a) by making, using, testing, offering for sale, selling, and/or importing those Accused Products, their components and processes, and/or

products containing the same that incorporated the fundamental technologies covered by the '555 patent. Further, Defendants are vicariously liable for this infringing conduct of its subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, NXP NV, NXP BV, and NXP USA, and their subsidiaries and related companies are essentially the same company, and NXP NV and/or NXP BV have the right and ability to control their subsidiaries infringing acts and receive a direct financial benefit from the infringement of its subsidiaries. Furthermore, on information and belief, NXP 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 NXP'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).

107. For example, NXP infringes claim 1 of the '555 patent via the Accused Products, including the 88W8997 series. The Accused Products, including the 88W8997 series, each are compliant with IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax, 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.nxp.com/docs/en/fact-sheet/88W8997-FACT-SHEET.pdf>.

88W8997 BLOCK DIAGRAM

Id. For example, each of the Accused Products, including the 88W8997 series, comprise a MIMO-OFDM transmission apparatus that transmits OFDM data symbols from two or more antennas in a data transmission period, such that each transmitted OFDM symbol contains four pilot symbols, in a 20 MHz transmission, inserted in carrier positions -21, -7, 7, and 21. *See, e.g.,* Sections 17.3.5.9, 19.1.1, 19.1.2, and 19.3.11.10 and Equation 19-54 of IEEE 802.11 2016. In another example, the Accused Products transmit OFDM symbols and their corresponding pilot symbols in a data transmission period (*e.g.,* the 3.2 μ s DFT period). *See, e.g.,* Sections 19.3.6, 19.3.11.10, 19.3.21, 19.4.3, and Equation 19-90 of IEEE 802.11 2016.

108. The Accused Products, including the 88W8997 series, each comprise an OFDM signal forming section that forms OFDM signals to be transmitted from the plurality of antennas. For example, the Accused Products form HT-mixed format PPDU signals into OFDM symbols to be transmitted from the two or more antennas. *See, e.g.,* Sections 19.1.1 and 19.3.4 of IEEE 802.11 2016.

109. The Accused Products, including the 88W8997 series, each comprise a pilot symbol mapping section that assigns orthogonal sequences to same carriers of the OFDM signals of a same time period. For example, each of the Accused Products assigns orthogonal sequences to same carriers of the OFDM carriers of a same time period (*e.g.*, the 3.2 μ s DFT period) by inserting pilot symbols in carrier positions -21, -7, 7, and 21 in each OFDM symbol, such that each sequence of the four pilot symbols is orthogonal to a corresponding sequence in the OFDM symbols of another space-time stream. *See, e.g.*, Section 19.3.11.10 and Equation 19-54 of IEEE 802.11 2016.

110. When the OFDM signals are transmitted from two antennas of the Accused Products, including the 88W8997 series, the pilot symbol mapping section of the Accused Products forms the pilot carriers such that pilot signals of orthogonal sequences are used for same pilot carriers between a first antenna and a second antenna. For example, when there are two space-time streams used for transmission by the Accused Products, the pilot sequences corresponding to stream one and stream two are orthogonal. *See, e.g.*, Table 19-19 of IEEE 802.11 2016.

111. When the OFDM signals are transmitted from two antennas of the Accused Products, including the 88W8997 series, the pilot symbol mapping section of the Accused Products forms the pilot carriers such that pilot signals of different sequences are used for different pilot carriers at each of the first antenna and the second antenna. For example, within transmissions from each antenna, pilot values differ from one pilot subcarrier to another pilot subcarrier and pilot values corresponding to a given carrier repeat over OFDM symbols, such that pilot values corresponding to different subcarriers at each antenna are different. *See, e.g.*, Table 19-19 of IEEE 802.11 2016.

112. When the OFDM signals are transmitted from two antennas of the Accused Products, including the 88W8997 series, the pilot symbol mapping section of the Accused

Products, form the pilot carriers such that pilot signals of a same sequence are used at the first antenna and the second antenna. For example, a cyclically rotated version of a same sequence of pilot values (*e.g.*, 1, 1, -1, -1) is repeated for each of the two antennas. *See, e.g.*, Table 19-19 of IEEE 802.11 2016.

113. The specific ways in which the Accused Products, including the 88W8997 series, are configured to support the aforementioned features of IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax 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.

114. Furthermore, the Accused Products, including the 88W8997 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '555 patent.

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

116. 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.

117. 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.

118. 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.

119. 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.

120. 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.

121. At a minimum, NXP NV, NXP BV, and NXP USA have known of the '555 patent at least as early as the filing date of the Complaint. In addition, NXP NV, NXP BV, and NXP USA have known about the '555 patent since at least November 8, 2021, when NXP NV and NXP USA received notice of their infringement of the '555 patent via a letter, and at least by November 20, 2021 when an agent for NXP USA replied to the letter. On January 28, 2022, NXP NV, NXP BV, and NXP USA received further notice of their infringement of the '555 patent when Redwood provided an infringement chart of the '555 patent to an agent for NXP USA via a data room accessible by NXP. An agent for NXP USA stated that it was refusing to access or review documents provided by Redwood, including the infringement chart of the '555 patent provided by Redwood via the data room. Furthermore, NXP NV, NXP BV, and NXP USA have known about the '555 patent since at least May 12, 2022, when an agent for NXP USA received further notice of their infringement via email. Indeed, the agent for NXP USA, Mikhail Lotvin, who received the aforementioned notices also identifies as an agent for NXP NV, where his LinkedIn profile identifies his role as Senior Counsel at NXP Semiconductors since 2012 and the LinkedIn page for NXP Semiconductors identifies itself as NXP Semiconductors N.V. *See* <https://www.linkedin.com/in/mikhail-lotvin-42804626/>; and <https://www.linkedin.com/company/nxp-semiconductors/>. On information and belief, NXP USA is an agent and alter ego of NXP NV and NXP BV. Based on information and belief, NXP NV and NXP BV were on notice of the '555 patent from at least the foregoing dates that NXP USA was

on notice of the '555 patent as a result of receiving actual or constructive notice from NXP USA, which is owned and controlled by its parents NXP NV and NXP BV.⁴

122. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP 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, NXP does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '555 patent. NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>;

⁴ *See* FN 2, *supra*.

<https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

123. On information and belief, despite having knowledge of the '555 patent and their infringement, Defendants specifically intended for others to import and sell products accused of infringing the '555 patent. For example, Defendants specifically intended for its U.S.-based subsidiaries or customers to import and sell products accused of infringing the '555 patent. On information and belief, Defendants instructed and encouraged the importers to import and/or sell products accused of infringing the '555 patent. On information and belief, the purchase and sale agreements between NXP NV, NXP BV, and NXP USA and the importers provide such instruction and/or encouragement. Further, on information and belief, Defendants' U.S.-based subsidiaries, affiliates, employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the '555 patent in the United States. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

124. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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, NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

125. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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 NXP 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, NXP 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 NXP 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. NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

126. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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, NXP 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. *See, e.g.,* <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>;

<https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

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

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

129. Plaintiff incorporates paragraphs 1 through 128 herein by reference.

130. 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.

131. 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.

132. NXP 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.

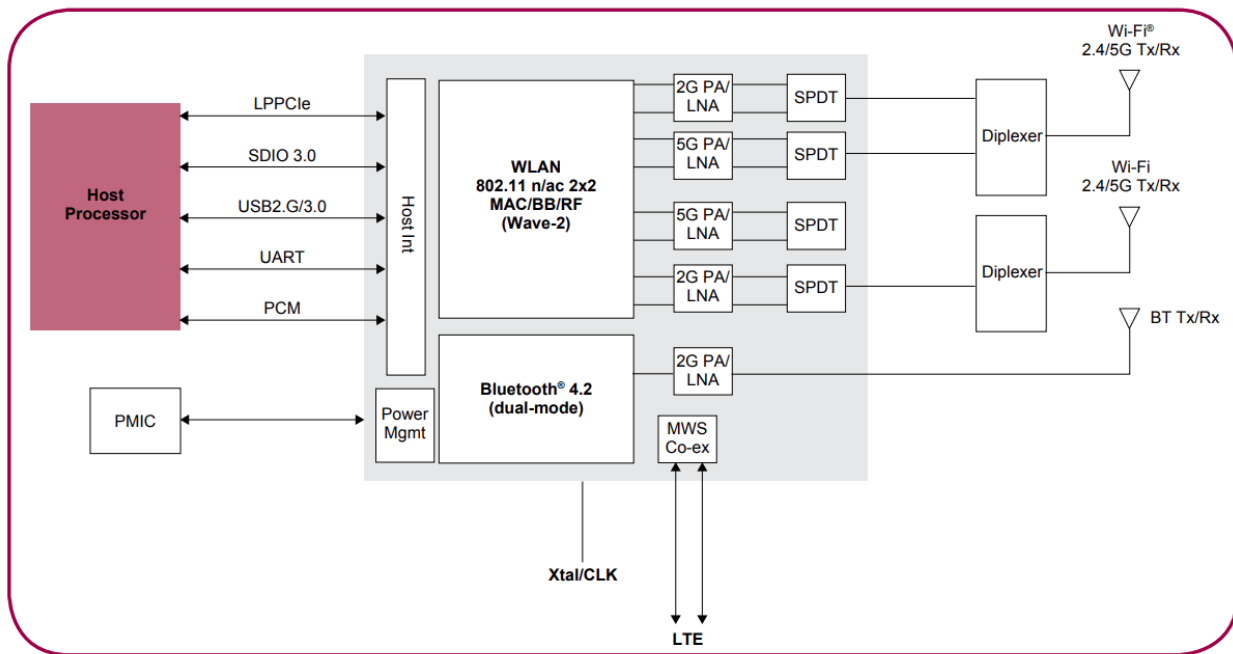
133. NXP directly infringes the '140 patent via 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '140 patent.

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

135. For example, NXP infringes claim 1 of the '140 patent via the Accused Products, including the 88W8997 series. The Accused Products, including the 88W8997 series, comprise a transmitting apparatus, in an orthogonal frequency division multiplexing communication system. *See, e.g.,* <https://www.nxp.com/docs/en/fact-sheet/88W8997-FACT-SHEET.pdf>.

88W8997 BLOCK DIAGRAM



Id.

136. The Accused Products, including the 88W8997 series, each comprise circuitry and/or components (hardware and/or software) for converting a transmission signal into a transmission time slot. For example, the Accused Products, including the 88W8997 series, convert PSDUs into PPDUs. *See, e.g.,* Sections 17.3.1 and 17.3.2.1 of IEEE 802.11 2016.

137. The Accused Products, including the 88W8997 series, each comprise circuitry and/or components (hardware and/or software) for generating a frame that includes a series of n

(greater than 1) time slots and a frame guard period added to the series of n time slots, where each time slot includes an effective symbol period and guard period added to the effective symbol period, where the length of the series of n time slots is less than the length of the frame. For example, each of the Accused Products, including the 88W8997 series, 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 88W8997 series, generates cyclic shifts that are added to the series of n time slots. *See, e.g.*, Sections 19.3.4 and 19.3.9.3.2 of IEEE 802.11 2016. Each time slot in the 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.

138. The Accused Products, including the 88W8997 series, each comprise circuitry and/or components (hardware and/or software) for transmitting the generated frame as a radio signal. *See, e.g.*, Section 17.3.8.2 of IEEE 802.11 2016.

139. The specific ways in which the Accused Products, including the 88W8997 series, are configured to support the aforementioned features of IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax 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.

140. Furthermore, the Accused Products, including the 88W8997 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '140 patent.

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

142. 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.

143. 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.

144. At a minimum, NXP NV, NXP BV, and NXP USA have known of the ’140 patent at least as early as the filing date of the Complaint. In addition, NXP NV, NXP BV, and NXP USA have known about the ’140 patent since at least November 8, 2021, when NXP NV and NXP USA received notice of their infringement of the ’140 patent via a letter, and at least by November 20, 2021 when an agent for NXP USA replied to the letter. On January 24, 2022, NXP NV, NXP BV, and NXP USA received further notice of their infringement of the ’140 patent when Redwood provided an infringement chart of the ’140 patent to an agent for NXP USA via a data room accessible by NXP. An agent for NXP USA stated that it was refusing to access or review documents provided by Redwood, including the infringement chart of the ’140 patent provided by Redwood via the data room. Furthermore, NXP NV, NXP BV, and NXP USA have known about the ’140 patent since at least May 12, 2022, when an agent for NXP USA received further notice of their infringement via email. Indeed, the agent for NXP USA, Mikhail Lotvin, who received the aforementioned notices also identifies as an agent for NXP NV, where his LinkedIn profile identifies his role as Senior Counsel at NXP Semiconductors since 2012 and the LinkedIn page for NXP Semiconductors identifies itself as NXP Semiconductors N.V. *See* <https://www.linkedin.com/in/mikhail-lotvin-42804626/>; and <https://www.linkedin.com/company/nxp-semiconductors/>. On information and belief, NXP USA is an agent and alter ego of NXP NV and NXP BV. Based on information and belief, NXP NV and NXP BV were on notice of the ’140 patent from at least the foregoing dates that NXP USA was

on notice of the '140 patent as a result of receiving actual or constructive notice from NXP USA, which is owned and controlled by its parents NXP NV and NXP BV.⁵

145. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP 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, NXP does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '140 patent. NXP 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. *See, e.g.*, [https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE](https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE;);

⁵ *See* FN 2, *supra*.

<https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

146. On information and belief, despite having knowledge of the '140 patent and their infringement, Defendants specifically intended for others to import and sell products accused of infringing the '140 patent. For example, Defendants specifically intended for its U.S.-based subsidiaries or customers to import and sell products accused of infringing the '140 patent. On information and belief, Defendants instructed and encouraged the importers to import and/or sell products accused of infringing the '140 patent. On information and belief, the purchase and sale agreements between NXP NV, NXP BV, and NXP USA and the importers provide such instruction and/or encouragement. Further, on information and belief, Defendants' U.S.-based subsidiaries, affiliates, employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the '140 patent in the United States. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

147. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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, NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

148. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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 NXP 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, NXP 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 NXP 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. NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

149. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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, NXP 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. *See, e.g.,* <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>;

<https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

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

151. Redwood has been damaged as a result of NXP's infringing conduct described in this Count. NXP is, thus, liable to Redwood in an amount that adequately compensates Redwood for NXP'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. 8,218,501)

152. Plaintiff incorporates paragraphs 1 through 151 herein by reference.

153. Redwood is the assignee of the '501 patent, entitled "Data Forwarding Controller, Communication Terminal Apparatus, Data Communication System and Method, and Computer Program for Performing Handover for a Mobile Node," with ownership of all substantial rights in the '501 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

154. The '501 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '501 patent issued from U.S. Patent Application No. 12/116,779.

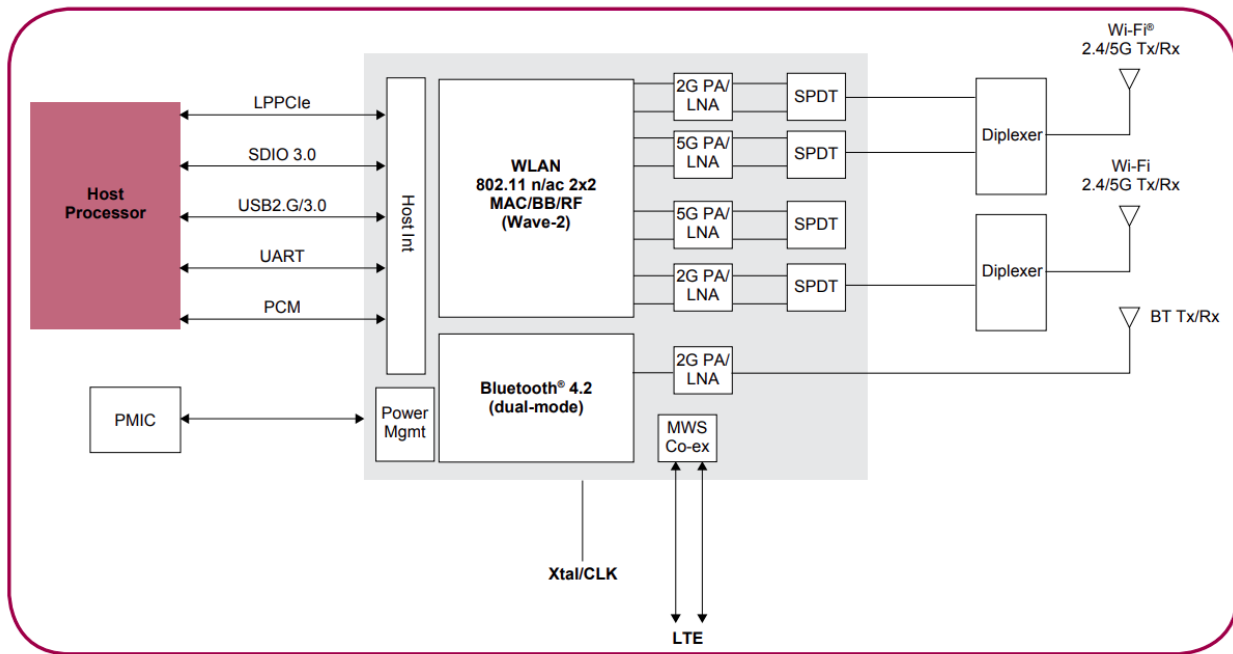
155. NXP has and continues to directly and/or indirectly infringe one or more claims of the '501 patent in this judicial district and elsewhere in Texas and the United States.

156. NXP directly infringes the '501 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 '501 patent.

157. Furthermore, NXP NV directly infringes the '501 patent through its direct involvement in the activities of its subsidiaries, including NXP BV and NXP USA. Similarly, NXP BV directly infringes the '501 patent through its direct involvement in the activities of its subsidiaries, including NXP USA. Such subsidiaries conduct activities that constitute direct infringement of the '501 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 '501 patent. Further, Defendants are vicariously liable for this infringing conduct of its subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, NXP NV, NXP BV, and NXP USA, and their subsidiaries and related companies are essentially the same company, and NXP NV and/or NXP BV have the right and ability to control their subsidiaries infringing acts and receive a direct financial benefit from the infringement of its subsidiaries. Furthermore, on information and belief, NXP 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 NXP'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 '501 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).

158. For example, NXP infringes claim 1 of the '501 patent via the Accused Products, including the 88W8997 series. The Accused Products, including the 88W8997 series, are compliant with IEEE 802.11r and comprise a mobile communication terminal apparatus which performs data transmission/reception via a network and which changes access points based on data receiving conditions. *See, e.g.,* Figure 13-5 of IEEE 802.11 2016; https://www.nxp.com/docs/en/release-note/L5.10.72_2.2.0_WIFI-Doc.pdf at p. 10 (compliance with IEEE 802.11r – Fast BSS Transition); and <https://www.nxp.com/docs/en/fact-sheet/88W8997-FACT-SHEET.pdf>.

88W8997 BLOCK DIAGRAM

Id.

159. The Accused Products, including the 88W8997 series, each comprise circuitry and/or components (hardware and/or software) configured to acquire a MAC address of a next access point to which the Accused Products are scheduled to be connected next after a handover from a current access point, and broadcast a handover start message containing the acquired MAC address of the next access point. For example, each of the Accused Products are configured to scan for beacon frames from neighborhood access points in a Neighbor Report element comprising the BSSID and BSSID information of neighborhood access points capable of Fast BSS Transition, where the Accused Products are configured to acquire the BSSID and BSSID information of a received beacon of a target access point to be connected to next after a handover from a current access point. *See, e.g.*, Figures 9-295, 9-296, 13-5 and Sections 9.4.2.37, 11.11.10.2, 11.11.10.3, and 13.3 of IEEE 802.11 2016. Further, each of the Accused Products are configured to broadcast

a start message requesting a handover that comprises the BSSID of the target access point. *See, e.g.*, Figure 13-5 and Section 13.5.3 of IEEE 802.11 2016.

160. The Accused Products, including the 88W8997 series, each comprise circuitry and/or components (hardware and/or software) configured to perform a handover process on condition that the Accused Products receive a handover setting completion message from a data forwarding controller as a response to the handover start message. For example, each of the Accused Products are configured to receive a handover setting completion message from a station management entity (“SME”) of the target access point in response to the handover start message, where the Accused Products are configured to perform a handover after receiving the handover setting completion message. *See, e.g.*, Figure 13-6 and Sections 9.4.1.9, 13.5.3, and 13.8.3 of IEEE 802.11 2016.

161. The Accused Products, including the 88W8997 series, each comprise circuitry and/or components (hardware and/or software) configured to perform a background scanning process by which all wireless channels are periodically scanned to acquire and store a source MAC address of a received beacon as the MAC address of the next access point. For example, each of the Accused Products are configured to periodically scan for beacon frames from neighborhood access points in a Neighbor Report element comprising the BSSID and BSSID information of neighborhood access points capable of Fast BSS Transition, where the Accused Products are configured to acquire and store the BSSID and BSSID information of a received beacon of the target access point. *See, e.g.*, Figures 9-295, 9-296, 13-5 and Sections 9.4.2.37, 11.11.10.2, 11.11.10.3, and 13.3 of IEEE 802.11 2016.

162. The specific ways in which the Accused Products, including the 88W8997 series, are configured to support the aforementioned features of IEEE 802.11r are further detailed in

confidential documents and/or source code that evidence infringement by the Accused Products as to Claim 1 of the '501 patent.

163. Furthermore, the Accused Products, including the 88W8997 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '501 patent.

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

165. The claims of the '501 patent are patent eligible under 35 U.S.C. § 101. The '501 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 '501 patent describes a specific problem to be solved in digital signal transmission and communication directed to uninterrupted communications even when a mobile device moves between access points and its claims are directed to specific ways of solving that problem. '501 patent, 1:25-28. The conventional solutions directed to this problem could not support sufficiently high-speed handovers, because those solutions required devices to perform a plurality of processes that must be sequentially performed. '501 patent, 1:15-27. Furthermore, during these processes of the conventional solutions, the switch left the entry of the MAC address of the mobile node unupdated, thereby resulting in the switch forwarding its received data packets addressed to the mobile node to the old access point to which the mobile node was connected before its movement. *Id.*

166. To overcome the aforementioned problems, the '501 patent and its claims describe specific solutions for uninterrupted communications even when a mobile device moves between access points. "A second aspect of the present invention provides a communication terminal apparatus of a mobile type which performs data transmission/reception via a network and which

changes access points based on data receiving conditions.” ’501 patent, 4:41-53. “The communication terminal apparatus is configured to acquire a MAC address of a next access point to which the communication terminal apparatus is scheduled to be connected next, and broadcast a handover start message containing the acquired MAC address of the next access point, and perform a handover process on condition that the communication terminal apparatus receives a handover setting completion message from a data forwarding controller as a response to the handover start message.” *Id.* The claimed inventions of the ’501 patent, including claim 1, are directed to this specific solution. “In an embodiment of the communication terminal apparatus of the present invention, the communication terminal apparatus is configured to perform a background scanning process by which all wireless channels are periodically scanned, to acquire and store a source MAC address of a received beacon as the MAC address of the next access point.” ’501 patent, 4:54-59. The claimed inventions of the ’501 patent, including claim 1, are directed to this specific solution.

167. Furthermore, the claimed inventions of the ’501 patent, including claim 1, provide a solution of reducing traffic on the network to improve data transmissions by utilizing a handover end message that allows for the original access point to stop forwarding data packets addressed to the mobile device that has been handed over to a new access point. ’501 patent, claim 1, 8:25-34.

168. The ’501 patent describes a specific problem to be solved for uninterrupted communications even when a mobile device moves between access points and specific ways of solving that problem. Those solutions are further implemented in the claims, including claim 1. Therefore, the claims of ’501 patent are patent eligible. In addition, the claims of the ’501 patent are directed to solving problems that solely arise in mobile computer technology (digital signal

communication and transmission) via specific improvements to its operation. As such, they are not patent ineligible abstract ideas.

169. 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.

170. At a minimum, NXP NV, NXP BV, and NXP USA have known of the '501 patent at least as early as the filing date of the Complaint. In addition, NXP NV, NXP BV, and NXP USA have known about the '501 patent since at least November 8, 2021, when NXP NV and NXP USA received notice of their infringement of the '501 patent via a letter, and at least by November 20, 2021 when an agent for NXP USA replied to the letter. On January 24, 2022, NXP NV, NXP BV, and NXP USA received further notice of their infringement of the '501 patent when Redwood provided an infringement chart of the '501 patent to an agent for NXP USA via a data room accessible by NXP. An agent for NXP USA stated that it was refusing to access or review documents provided by Redwood, including the infringement chart of the '501 patent provided by Redwood via the data room. Furthermore, NXP NV, NXP BV, and NXP USA have known about the '501 patent since at least May 12, 2022, when an agent for NXP USA received further notice of their infringement via email. Indeed, the agent for NXP USA, Mikhail Lotvin, who received the aforementioned notices also identifies as an agent for NXP NV, where his LinkedIn profile identifies his role as Senior Counsel at NXP Semiconductors since 2012 and the LinkedIn page for NXP Semiconductors identifies itself as NXP Semiconductors N.V. *See* <https://www.linkedin.com/in/mikhail-lotvin-42804626/>; and <https://www.linkedin.com/company/nxp-semiconductors/>. On information and belief, NXP USA is an agent and alter ego of NXP NV and NXP BV. Based on information and belief, NXP NV and NXP BV were on notice of the '501 patent from at least the foregoing dates that NXP USA was

on notice of the '501 patent as a result of receiving actual or constructive notice from NXP USA, which is owned and controlled by its parents NXP NV and NXP BV.⁶

171. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP 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 '501 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, NXP does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '501 patent. NXP 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. *See, e.g.*, [https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE](https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE;);

⁶ *See* FN 2, *supra*.

<https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

172. On information and belief, despite having knowledge of the '501 patent and their infringement, Defendants specifically intended for others to import and sell products accused of infringing the '501 patent. For example, Defendants specifically intended for its U.S.-based subsidiaries or customers to import and sell products accused of infringing the '501 patent. On information and belief, Defendants instructed and encouraged the importers to import and/or sell products accused of infringing the '501 patent. On information and belief, the purchase and sale agreements between NXP NV, NXP BV, and NXP USA and the importers provide such instruction and/or encouragement. Further, on information and belief, Defendants' U.S.-based subsidiaries, affiliates, employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the '501 patent in the United States. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

173. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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 '501 patent, constituting a material part of the invention. On information and belief, NXP knows and has known the same to be especially made or especially adapted for use in an infringement of the '501 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, NXP 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 '501 patent that are especially made or especially adapted for use in end user products that infringe the '501 patent; and the components are not a staple article or commodity of commerce suitable for substantial noninfringing use. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

174. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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 '501 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, NXP 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 '501 patent, where NXP 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, NXP 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 '501 patent, where NXP 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. NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

175. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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 '501 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, NXP 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 '501 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, NXP 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 '501 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. *See, e.g.,* <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>;

<https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

176. On information and belief, despite having knowledge of the '501 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '501 patent, NXP has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. NXP's infringing activities relative to the '501 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.

177. Redwood has been damaged as a result of NXP's infringing conduct described in this Count. NXP is, thus, liable to Redwood in an amount that adequately compensates Redwood for NXP'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. 9,374,209)

178. Plaintiff incorporates paragraphs 1 through 177 herein by reference.

179. 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.

180. 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.

181. NXP 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.

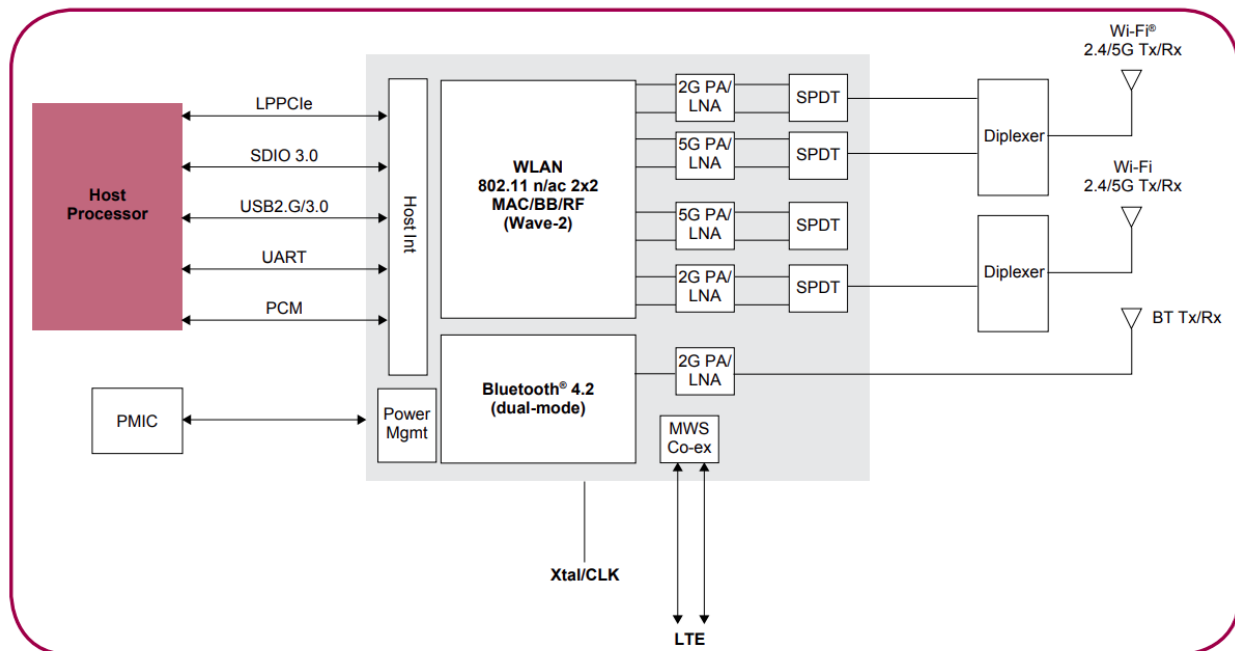
182. NXP directly infringes the '209 patent via 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '209 patent.

183. Furthermore, NXP NV directly infringes the '209 patent through its direct involvement in the activities of its subsidiaries, including NXP BV and NXP USA. Similarly, NXP BV directly infringes the '209 patent through its direct involvement in the activities of its subsidiaries, including NXP USA. Such subsidiaries conduct activities that constitute direct infringement of the '209 patent under 35 U.S.C. § 271(a) by making, using, testing, offering for sale, selling, and/or importing those Accused Products, their components and processes, and/or products containing the same that incorporated the fundamental technologies covered by the '209 patent. Further, Defendants are vicariously liable for this infringing conduct of its subsidiaries (under both the alter ego and agency theories) because, as an example and on information and belief, NXP NV, NXP BV, and NXP USA, and their subsidiaries and related companies are essentially the same company, and NXP NV and/or NXP BV have the right and ability to control their subsidiaries infringing acts and receive a direct financial benefit from the infringement of its subsidiaries. Furthermore, on information and belief, NXP 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 NXP'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).

184. For example, NXP infringes claim 1 of the '209 patent via the Accused Products, including the 88W8997 series. The Accused Products, including the 88W8997 series, comprise a transmission signal generation apparatus configured to generate transmission signals (*e.g.*, HT-mixed format transmission signals). *See, e.g.*, Figure 19-2 of IEEE 802.11 2016; *See, e.g.*, <https://www.nxp.com/docs/en/fact-sheet/88W8997-FACT-SHEET.pdf>.

88W8997 BLOCK DIAGRAM



Id.

185. The Accused Products, including the 88W8997 series, each comprise circuitry and/or components (hardware and/or software) configured to generate one or more transmission signals, where each transmission signal includes a data frame having preamble information, pilot information, and data information. *See, e.g.*, Sections 19.3.3 and 19.3.20 and Figure 19-2 of IEEE 802.11 2016. Further, each of the transmission signals include the PHY preamble, at least four pilot symbols, and data information. *See, e.g.*, Sections 19.3.1, 19.3.11.10, and 19.3.20 of IEEE 802.11 2016.

186. 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.

187. 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.

188. The Accused Products, including the 88W8997 series, each comprise circuitry and/or components (hardware and/or software) of an Inverse Fourier transformer configured to generate for each of the one or more transmission signals a corresponding OFDM signal for

transmission by a corresponding one of one or more antennas by Inverse Fourier transforming each of the transmission signals. *See, e.g.*, Section 19.3.3 and Figure 19-3 of IEEE 802.11 2016.

189. The Inverse Fourier transformer of each of the Accused Products, including the 88W8997 series, is configured to arrange the pilot symbol sequences in corresponding pilot carriers during a first time period. For example, the Inverse Fourier transformer is configured to arrange pilot sequences in the pilot carriers of each OFDM symbol transmitted during a first time period (*e.g.*, the 3.2 μ s DFT period). *See, e.g.*, Section 19.3.6, 19.3.11.10, 19.3.21, 19.4.3, and Equation 19-90 of IEEE 802.11 2016.

190. The transmitter of each of the Accused Products, including the 88W8997 series, is configured to arrange sets of the pilot carriers in a same carrier position in the OFDM signal, where the plural pilot symbol sequences are all orthogonal to each other. For example, the transmitter is configured to arrange pilot sequences for each space-time stream, where each of the OFDM signals contains four pilot carriers inserted in, for example, carrier positions -21, -7, 7, and 21. *See, e.g.*, Section 19.3.11.10, Equation 19-54, and Table 19-19 of IEEE 802.11 2016. Pilot sequences corresponding to different spatial streams are orthogonal to each other. *See, e.g.*, Table 19-19 of IEEE 802.11 2016.

191. The specific ways in which the Accused Products, including the 88W8997 series, are configured to support the aforementioned features of IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax 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.

192. Furthermore, the Accused Products, including the 88W8997 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '209 patent.

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

194. 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.

195. 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.

196. 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.

197. 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.

198. At a minimum, NXP NV, NXP BV, and NXP USA have known of the '209 patent at least as early as the filing date of the Complaint. In addition, NXP NV, NXP BV, and NXP USA have known about the '209 patent since at least November 8, 2021, when NXP NV and NXP USA received notice of their infringement of the '209 patent via a letter, and at least by November 20, 2021 when an agent for NXP USA replied to the letter. On January 24, 2022, NXP NV, NXP BV, and NXP USA received further notice of their infringement of the '209 patent when Redwood provided an infringement chart of the '209 patent to an agent for NXP USA via a data room accessible by NXP. An agent for NXP USA stated that it was refusing to access or review documents provided by Redwood, including the infringement chart of the '209 patent provided by Redwood via the data room. Furthermore, NXP NV, NXP BV, and NXP USA have known about the '209 patent since at least May 12, 2022, when an agent for NXP USA received further notice of their infringement via email. Indeed, the agent for NXP USA, Mikhail Lotvin, who received the aforementioned notices also identifies as an agent for NXP NV, where his LinkedIn profile identifies his role as Senior Counsel at NXP Semiconductors since 2012 and the LinkedIn page for NXP Semiconductors identifies itself as NXP Semiconductors N.V. See <https://www.linkedin.com/in/mikhail-lotvin-42804626/>; and <https://www.linkedin.com/company/nxp-semiconductors/>. On information and belief, NXP USA

is an agent and alter ego of NXP NV and NXP BV. Based on information and belief, NXP NV and NXP BV were on notice of the '209 patent from at least the foregoing dates that NXP USA was on notice of the '209 patent as a result of receiving actual or constructive notice from NXP USA, which is owned and controlled by its parents NXP NV and NXP BV.⁷

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

⁷ See FN 2, *supra*.

products to these purchasers and/or sellers in the United States. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

200. On information and belief, despite having knowledge of the '209 patent and their infringement, Defendants specifically intended for others to import and sell products accused of infringing the '209 patent. For example, Defendants specifically intended for its U.S.-based subsidiaries or customers to import and sell products accused of infringing the '209 patent. On information and belief, Defendants instructed and encouraged the importers to import and/or sell products accused of infringing the '209 patent. On information and belief, the purchase and sale agreements between NXP NV, NXP BV, and NXP USA and the importers provide such instruction and/or encouragement. Further, on information and belief, Defendants' U.S.-based subsidiaries, affiliates, employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the '209 patent in the United States. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

201. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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, NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE;>
<https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

202. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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 NXP 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, NXP 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 NXP 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. NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27> 540.

203. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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, NXP 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. See, e.g., <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE;>
[https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540.](https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540)

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

205. Redwood has been damaged as a result of NXP's infringing conduct described in this Count. NXP is, thus, liable to Redwood in an amount that adequately compensates Redwood for NXP'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. 10,270,574)

206. Plaintiff incorporates paragraphs 1 through 205 herein by reference.

207. 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.

208. 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.

209. NXP 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.

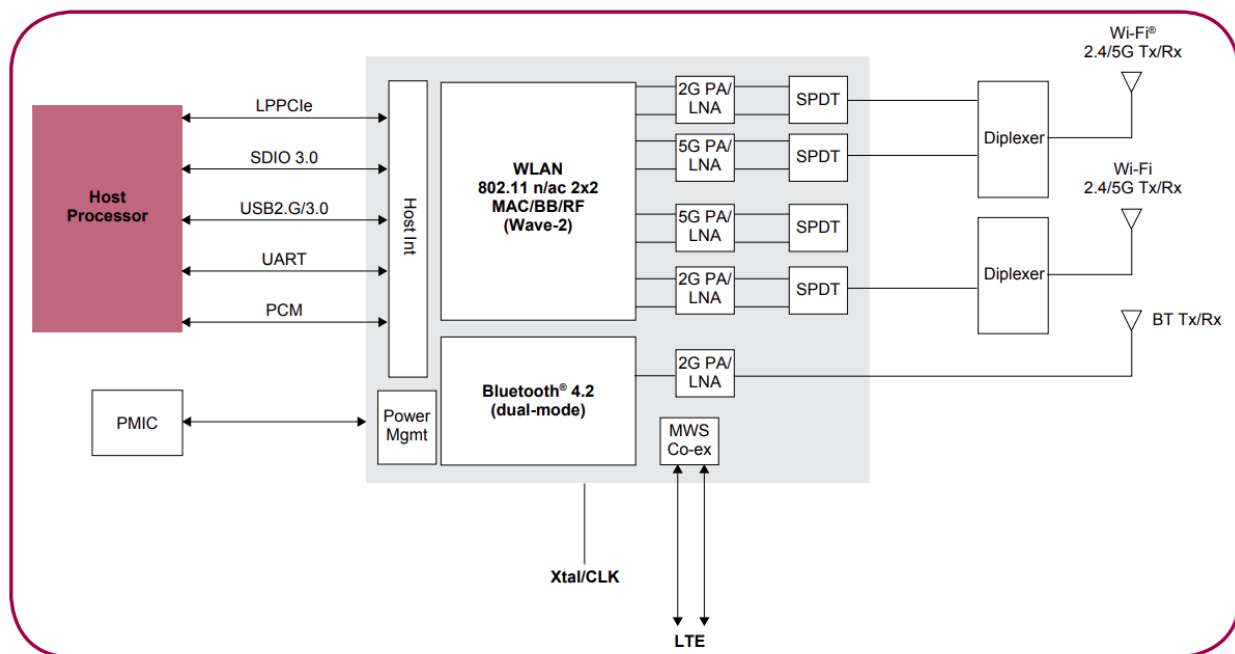
210. NXP directly infringes the '574 patent via 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '574 patent.

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

212. For example, NXP infringes claim 1 of the '574 patent via the Accused Products, including the 88W8997 series. The Accused Products, including the 88W8997 series, are compliant with IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax and/or IEEE be and comprise a transmission apparatus that includes electronic circuitry compliant with the aforementioned IEEE standards. *See, e.g.,* Sections 17.3.8.2, 19.1.1, 19.3.3 and Figure 19-3 of IEEE 802.11 2016; *See, e.g.,* <https://www.nxp.com/docs/en/fact-sheet/88W8997-FACT-SHEET.pdf>.

88W8997 BLOCK DIAGRAM



Id.

213. The Accused Products, including the 88W8997 series, comprise electronic circuitry configured to map a first stream of input data to first complex symbols in serial format. For example, the Accused Products comprise a constellation mapper to map a sequence of bits to a series of complex numbers. *See, e.g.*, Section 17.3.2.2 of IEEE 802.11 2016.

214. The Accused Products, including the 88W8997 series, comprise electronic circuitry configured to convert the first complex symbols in serial format into first complex symbols in parallel format. For example, the Accused Products are configured to insert the complex numbers into subcarriers associated with one OFDM symbol, such that the information in each subcarrier is transmitted in parallel as part of the full OFDM symbol. *See, e.g.*, Section 17.3.2.2 of IEEE 802.11 2016. For example, a complex value $-0.316 + 0.316j$ is inserted in subcarrier 26 to form OFDM symbols in the frequency domain. *See, e.g.*, Section I.1.6.3 and Table I-20 of IEEE 802.11 2016.

215. The Accused Products, including the 88W8997 series, comprise electronic circuitry configured to perform an inverse Fourier transform on the first complex symbols in parallel format to form first Orthogonal Frequency Division Multiplexed (OFDM) signals associated with multiple subcarriers. For example, the Accused Products comprise inverse discrete fourier transform sections configured to convert the plurality of symbols to OFDM time domain blocks for transmission. *See, e.g.*, Section 17.3.2.2 of IEEE 802.11 2016.

216. The Accused Products, including the 88W8997 series, comprise electronic circuitry configured to transmit the first OFDM signals over the multiple subcarriers in a same frequency band over a same time period that includes a same set of time slots. For example, the Accused Products are configured to transmit signals comprising OFDM symbols, where each OFDM symbol is a time slot and transmissions occur within a same time period indicated by the TXTIME

parameter over a channel having the same frequency band (e.g., 20 MHz). *See, e.g.*, Sections 17.3.2.2, 19.3.15.1, 19.3.221, Figure 17.1, and Equation 19-90 of IEEE 802.11 2016.

217. The Accused Products, including the 88W8997 series, comprise electronic circuitry configured to transmit first pilot information on a first one of a plurality of pilot subcarriers during the same set of time slots. For example, the Accused Products are configured to transmit a first pilot value of 1 placed on a first pilot subcarrier within an OFDM symbol during the same set of time slots. *See, e.g.*, Sections 17.3.5.9 and Table 19-19 of IEEE 802.11 2016.

218. The Accused Products, including the 88W8997 series, comprise electronic circuitry configured to transmit second pilot information on a second one of a plurality of pilot subcarriers during the same set of time slots, the second pilot information being different from the first pilot information. For example, the Accused Products are configured to transmit a second pilot value of -1 placed on a second pilot subcarrier within an OFDM symbol that will be transmitted during the same set of time slots. *See, e.g.*, Sections 17.3.5.9 and Table 19-19 of IEEE 802.11 2016.

219. The Accused Products, including the 88W8997 series, comprise electronic circuitry configured to map a second stream of input data to second complex symbols in serial format. For example, the Accused Products comprise a constellation mapper to map a sequence of bits to a series of constellation points. *See, e.g.*, Section 17.3.2.2 of IEEE 802.11 2016.

220. The Accused Products, including the 88W8997 series, comprise electronic circuitry configured to convert the second complex symbols in serial format into second complex symbols in parallel format. For example, the Accused Products are configured to insert the complex numbers into subcarriers associated with one OFDM symbol, such that the information in each subcarrier is transmitted in parallel as part of the full OFDM symbol. *See, e.g.*, Section 17.3.2.2 of IEEE 802.11 2016. For example, a complex value $-0.316 + 0.316j$ is inserted in subcarrier 26 to

form OFDM symbols in the frequency domain. *See, e.g.*, Section I.1.6.3 and Table I-20 of IEEE 802.11 2016.

221. The Accused Products, including the 88W8997 series, comprise electronic circuitry configured to perform an inverse Fourier transform on the second complex symbols in parallel format to form second OFDM signals associated with the multiple subcarriers. For example, the Accused Products comprise inverse discrete fourier transform sections configured to convert the plurality of symbols to OFDM time domain blocks for transmission. *See, e.g.*, Section 17.3.2.2 of IEEE 802.11 2016.

222. The Accused Products, including the 88W8997 series, comprise electronic circuitry configured to transmit the second OFDM signals over the multiple subcarriers in the same frequency band over the same time period that includes the same set of time slots. For example, the Accused Products are configured to transmit signals comprising OFDM symbols, where each OFDM symbol is a time slot and transmissions occur within a same time period indicated by the TXTIME parameter over a channel having the same frequency band (e.g., 20 MHz). *See, e.g.*, Sections 17.3.2.2, 19.3.15.1, 19.3.221, Figure 17.1, and Equation 19-90 of IEEE 802.11 2016.

223. The Accused Products, including the 88W8997 series, comprise electronic circuitry configured to transmit the first pilot information on the second pilot subcarrier during the same set of time slots. For example, the Accused Products are configured to transmit a first pilot value of 1 placed on a second pilot subcarrier within an OFDM symbol during the same set of time slots. *See, e.g.*, Sections 17.3.5.9 and Table 19-19 of IEEE 802.11 2016.

224. The Accused Products, including the 88W8997 series, comprise electronic circuitry configured to transmit the second pilot information on one of the plurality of pilot subcarriers during the same set of time slots. For example, the Accused Products are configured to transmit a

second pilot value of -1 placed on a pilot subcarrier within an OFDM symbol that will be transmitted during the same set of time slots. *See, e.g.*, Sections 17.3.5.9 and Table 19-19 of IEEE 802.11 2016.

225. The specific ways in which the Accused Products, including the 88W8997 series, are configured to support the aforementioned features of IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax 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.

226. Furthermore, the Accused Products, including the 88W8997 series, are configured or implemented in an infringing manner with the features and functionality recited in at least Claim 1 of the '574 patent.

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

228. 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.

229. 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.

230. 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.

231. 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.

232. 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.

233. At a minimum, NXP NV, NXP BV, and NXP USA have known of the '574 patent at least as early as the filing date of the Complaint. In addition, NXP NV, NXP BV, and NXP USA have known about the '574 patent since at least November 8, 2021, when NXP NV and NXP USA received notice of their infringement of the '574 patent via a letter, and at least by November 20, 2021 when an agent for NXP USA replied to the letter. On January 24, 2022, NXP NV, NXP BV, and NXP USA received further notice of their infringement of the '574 patent when Redwood provided an infringement chart of the '574 patent to an agent for NXP USA via a data room accessible by NXP. An agent for NXP USA stated that it was refusing to access or review documents provided by Redwood, including the infringement chart of the '574 patent provided by Redwood via the data room. Furthermore, NXP NV, NXP BV, and NXP USA have known about the '574 patent since at least May 12, 2022, when an agent for NXP USA received further notice of their infringement via email. Indeed, the agent for NXP USA, Mikhail Lotvin, who received the aforementioned notices also identifies as an agent for NXP NV, where his LinkedIn profile identifies his role as Senior Counsel at NXP Semiconductors since 2012 and the LinkedIn page for NXP Semiconductors identifies itself as NXP Semiconductors N.V. *See* <https://www.linkedin.com/in/mikhail-lotvin-42804626/>; and <https://www.linkedin.com/company/nxp-semiconductors/>. On information and belief, NXP USA is an agent and alter ego of NXP NV and NXP BV. Based on information and belief, NXP NV and NXP BV were on notice of the '574 patent from at least the foregoing dates that NXP USA was on notice of the '574 patent as a result of receiving actual or constructive notice from NXP USA, which is owned and controlled by its parents NXP NV and NXP BV.⁸

⁸ *See* FN 2, *supra*.

234. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP 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, NXP does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '574 patent. NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

235. On information and belief, despite having knowledge of the '574 patent and their infringement, Defendants specifically intended for others to import and sell products accused of infringing the '574 patent. For example, Defendants specifically intended for its U.S.-based subsidiaries or customers to import and sell products accused of infringing the '574 patent. On information and belief, Defendants instructed and encouraged the importers to import and/or sell products accused of infringing the '574 patent. On information and belief, the purchase and sale agreements between NXP NV, NXP BV, and NXP USA and the importers provide such instruction and/or encouragement. Further, on information and belief, Defendants' U.S.-based subsidiaries, affiliates, employees, agents, and/or related companies existed for inter alia, the purpose of importing and selling products accused of infringing the '574 patent in the United States. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

236. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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, NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540>.

237. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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 NXP 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, NXP 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 NXP 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. NXP 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. *See, e.g.*, <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE>; <https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27> 540.

238. On information and belief, since at least the above-mentioned dates when NXP was on notice of its infringement, NXP'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, NXP 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, NXP 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. *See, e.g.,* <https://www.nxp.com/design/design-center/partner-marketplace:PARTNER-MARKETPLACE;>
[https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540.](https://www.nxp.com/webapp/connect/displayPartnerProfile.sp?partnerId=14080&offeringId=27540)

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

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

241. Plaintiff Redwood is entitled to recover from NXP the damages sustained by Plaintiff as a result of NXP'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.

242. 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

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

PRAYER FOR RELIEF

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

1. A judgment that NXP 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 NXP;
3. A judgment and order requiring NXP 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 NXP 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 NXP 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 8, 2024

Respectfully submitted,

/s/ Patrick J. Conroy

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