

**PUBLIC VERSION**

**UNITED STATES INTERNATIONAL TRADE COMMISSION**

**Washington, D.C.**

**In the Matter of**

**CERTAIN AUDIO PROCESSING  
HARDWARE, SOFTWARE, AND  
PRODUCTS CONTAINING THE SAME**

**Inv. No. 337-TA-1026**

**INITIAL DETERMINATION ON VIOLATION OF SECTION 337**

Administrative Law Judge Dee Lord

(October 26, 2017)

**Appearances:**

*For Complainant Andrea Electronics Corp.:*

William D. Belanger, Esq., Frank D. Liu, Esq., and Brittanee L. Friedman, Esq., of Pepper Hamilton LLP in Boston, MA; Goutam Patnaik, Esq., Bradley T. Lennie, Esq., Tuhin Ganguly, Esq., and David J. Shaw, Esq., of Pepper Hamilton LLP in Washington, DC

*For Respondent Apple, Inc.:*

David T. Pritikin, Esq., of Sidley Austin LLP in Chicago, IL; Ching-Lee Fukuda, Esq., and Ketan V. Patel, Esq., of Sidley Austin LLP in New York, NY; Michael R. Franzinger, Esq., Thomas A. Broughan, III, Esq., and Lauren C. Cranford, Esq., of Sidley Austin LLP in Washington, DC; Steven S. Baik, Esq. and Nathan A. Greenblatt, Esq., of Sidley Austin LLP in Palo Alto, CA

*For the Commission Investigative Staff:*

R. Whitney Winston, Esq., and Jeffrey Hsu, Esq., of the Office of Unfair Import Investigations, U.S. International Trade Commission, of Washington, D.C.

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Pursuant to the Notice of Investigation (Oct. 19, 2016) and Commission Rule 210.42, this is the administrative law judge's final initial determination on violation and recommended determination on remedy and bonding in the matter of *Certain Audio Processing Hardware, Software, and Products Containing the Same*, Inv. No. 337-TA-1026. 19 C.F.R. § 210.42(a)(1).

For the reasons discussed herein, it is my final initial determination that there is no violation of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, in the importation into the United States, the sale for importation, and/or the sale within the United States after importation of certain audio processing hardware, software, and products containing the same by reason of infringement of U.S. Patent No. 6,363,345 ("the '345 patent").

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The following abbreviations may be used in this Initial Determination:

<b>Tr.</b>	Transcript
<b>WS</b>	Witness Statement
<b>DWS</b>	Direct Witness Statement
<b>RWS</b>	Rebuttal Witness Statement
<b>JX</b>	Joint Exhibit
<b>CX</b>	Complainant's exhibit
<b>CPX</b>	Complainant's physical exhibit
<b>CDX</b>	Complainant's demonstrative exhibit
<b>RX</b>	Respondent's exhibit
<b>RPX</b>	Respondent's physical exhibit
<b>RDX</b>	Respondent's demonstrative exhibit
<b>CPHB</b>	Complainant's pre-hearing brief
<b>CIB</b>	Complainant's initial post-hearing brief
<b>CRB</b>	Complainant's reply post-hearing brief
<b>RPHB</b>	Respondent's pre-hearing brief
<b>RIB</b>	Respondent's corrected initial post-hearing brief <sup>1</sup>
<b>RRB</b>	Respondent's reply post-hearing brief
<b>SPHB</b>	Staff pre-hearing brief
<b>SIB</b>	Staff initial post-hearing brief
<b>SRB</b>	Staff reply post-hearing brief

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<sup>1</sup> Apple filed an initial post-hearing brief on September 8, 2017. As originally filed, Apple's initial post-hearing brief included "four references to non-admitted evidence." Letter from M. Franzinger to Secretary Barton (Sept. 14, 2017). On September 14, 2017, Apple filed a corrected version of its post-hearing brief in which the references to non-admitted materials were removed. *Id.* References herein to Apple's initial post-hearing brief are to the corrected version.

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### I. BACKGROUND

#### A. Procedural History

The Commission instituted this investigation in response to a complaint alleging violations of section 337 of the Tariff Act of 1930, as amended, by reason of infringement of U.S. Patent Nos. 6,049,607 (“the ’607 patent”); 6,363,345 (“the ’345 patent”); and 6,377,637 (“the ’637 patent”). Notice of Investigation (Oct. 19, 2016). The Commission ordered that an investigation be instituted to determine

whether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain audio processing hardware, software, and products containing the same by reason of infringement of one or more of claims 1-12 and 25-37 of the ’607 patent; claims 1-25, 38-40, and 42-47 of the ’345 patent; claims 1-14 of the ’637 patent, and whether an industry in the United States exists as required by subsection (a)(2) of section 337. . . .

*Id.* at 2. The Commission further ordered, pursuant to Commission Rule 210.50(b)(1), that

the presiding administrative law judge shall take evidence or other information and hear arguments from the parties or other interested persons with respect to the public interest in this investigation, as appropriate, and provide the Commission with findings of fact and a recommended determination on this issue, which shall be limited to the statutory public interest factors set forth in 19 U.S.C. §§ 1337(d)(1), (f)(1), (g)(1). . . .

*Id.* The Notice of Investigation was published in the Federal Register, instituting the investigation on Tuesday, October 25, 2016. 81 Fed. Reg. 73418-19 (2016); *see* 19 C.F.R. § 210.10(b).

The complainant is Andrea Electronics Corporation (“Andrea”). The Notice of Investigation named Apple Inc. (“Apple”) and Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, “Samsung”) as respondents. Pursuant to Order No. 68 (Aug. 22, 2017), Samsung was terminated from the investigation on the basis of a settlement agreement. *See* Comm’n Notice (Sept. 13, 2017). Pursuant to Order No. 31 (May 10, 2017), the

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investigation was terminated as to the '637 patent based on Andrea's withdrawal of its allegations. *See* Comm'n Notice (May 25, 2017). Pursuant to Order No. 37, the '607 patent was terminated in its entirety based on Andrea's withdrawal of its allegations. *See* Comm'n Notice (June 30, 2017).<sup>2</sup> On July 28, 2017, I granted in part Apple's motion for summary determination of no infringement, finding that Andrea was precluded under the *Festo* doctrine from asserting infringement under the doctrine of equivalents. Order No. 47, *unreviewed*, Comm'n Notice (Aug. 29, 2017). A *Markman* hearing was held on April 11, 2017, and a *Markman* Order (Order No. 34) issued on June 1, 2017 construing certain claim terms. A four-day evidentiary hearing was held on August 21, 2017 through August 24, 2017.

### **B. The Private Parties**

#### **1. Complainant**

Andrea is the complainant in this investigation. Andrea is a publicly held company with its corporate headquarters located in Bohemia, New York. Complaint (Sept. 19, 2016), ¶ 7.

#### **2. Respondent**

Apple is the remaining respondent in this investigation. Apple is organized and exists under the laws of California and its principal place of business is located in Cupertino, California. Apple's Answer to the Complaint (Nov. 21, 2016), ¶ 25.

### **C. Witness Testimony**

I received testimonial evidence in this investigation in the form of witness statements, live testimony, and deposition designations.

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<sup>2</sup> Pursuant to Order No. 35 (June 1, 2017), claims 2-4 and 8-11 of the '607 patent were terminated from the investigation as being invalid as indefinite. Because Order No. 37 terminated the '607 patent from the investigation in its entirety, the Commission found that Order No. 35 had been rendered moot.

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### 1. Fact Witnesses

At the hearing, Andrea presented the testimony of Douglas J. Andrea, the president, chief executive officer, and corporate secretary of Andrea. CX-0001C (Andrea DWS) at Q/A 3; Tr. at 78:4-131:20. Andrea also called Corisa Guiffre, the vice president, chief financial officer, and assistant corporate secretary of Andrea. CX-0002C (Guiffre DWS) at Q/A 3; Tr. at 132:1-206:6. Andrea also called Leonard Shoell, Stephan Auguste, and Benjamin Mahonri Faber. Mr. Shoell is a senior software engineer at Andrea. CX-0004C (Shoell DWS) at Q/A 3; Tr. at 236:4-258:2. Mr. Auguste is an electrical engineer and supervisor at Andrea. CX-0005C (Auguste DWS) at Q/A 3; Tr. at 258:3-281:10. Mr. Faber is an independent contractor who works for Andrea. CX-0006C (Faber DWS) at Q/A 6, 8; Tr. at 281:24-300:15. Andrea also called David Gough, a third party witness. Tr. at 664:23-683:3. Mr. Gough had been previously employed as a senior audio engineer at HP. Tr. at 666:9-13.

Apple called Vasu Iyengar and Michael Jaynes. Mr. Iyengar is an engineering manager at Apple and manages the team of engineers responsible for telephony signal processing in Apple products. RX-0009C (Iyengar DWS) at Q/A 3; Tr. at 428:14-446:3. Mr. Jaynes is a financial manager at Apple. RX-0010C (Jaynes DWS) at Q/A 4; Tr. at 592:3-600:25. Apple also called John Probst and Joseph Marash as adverse witnesses. Tr. at 206:17-220:28 (Probst); Tr. at 463:4-522:22. Mr. Probst is the director of product development at Andrea. Tr. at 207:19-21. Mr. Marash is first named co-inventor on the '345 patent. JX-0001.

### 2. Expert Witnesses

The private parties also rely on several outside experts to render opinions on infringement, invalidity, domestic industry, and remedy. Andrew DeJaco is a technical expert for Andrea, and his testimony was admitted as that of an expert in digital signal processing, with

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a particular emphasis in noise suppression. CX-0007C (DeJaco DWS); Tr. at 302:6-399:5; *see id.* at 303:11-23 (expert qualification). Dr. Michael P. Akemann, Ph.D., is an economic expert for Andrea, and his testimony was admitted as that of an expert in economics, competition, and intellectual property issues. CX-0008C (Akemann DWS); Tr. at 399:11-427:19; *see id.* 401:18-402:3 (expert qualification). Dr. Scott Douglas, Ph.D., is a technical expert for Andrea, and his testimony was admitted as that of an expert in adaptive signal processing, acoustics, and speech processing. CX-1888C (Douglas RWS); Tr. at 824:8-839:9; *see id.* at 825:11-25 (expert qualification).

Dr. Jordan Cohen, Ph.D., is a technical expert for Apple, and his testimony was admitted as that of an expert in signal processing, with particular expertise in audio and noise processing. RX-0011C (Cohen RWS); Tr. 523:6-588:17; *id.* at 526:10-21 (expert qualification). Dr. Michael Spencer, Ph.D., is a technical expert for Apple, and his testimony was admitted as that of an expert in signal processing, with particular expertise in audio and noise processing. RX-0005C (Spencer RWS); Tr. at 702:3-777:11; *id.* at 703:8-25 (expert qualification). Dr. Christos Kyriakakis, Ph.D., is a technical expert for Apple, and his testimony was admitted as that of an expert in signal processing, with particular expertise in audio signal processing and noise processing. RX-0003C (Kyriakakis DWS); Tr. at 777:25-823:2; *id.* at 779:19-780:6 (expert qualification). Dr. Thomas D. Vander Veen, Ph.D., is an economics expert for Apple, and his testimony was admitted as that of an expert in the field of economic analysis and intellectual property matters. RX-0006C (Vander Veen DWS); RX-0008C (Vander Veen RWS); Tr. at 601:3-664:18; *id.* at 603:1-11 (expert qualification).



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### 3. Deposition Designations

The private parties submitted additional testimony through deposition designations pursuant to Commission Rule 210.28(g). These include designations from deposition transcripts of Apple witnesses Arvinth Krishnaswamy (JX-0010C), Lalin Thevarapperuma (JX-0012C), Vasu Iyengar (JX-0014C), Sharon Liu (JX-0015C), Michael Jaynes (JX-0016C), Sharon O'Mara (JX-0018C) and Andrea witnesses Douglas Andrea (JX-0019C), Corisa Guiffre (JX-0020C), John Probst (JX-0021C), Leonard Shoell (JX-0022C), and Benjamin Faber (JX-0023C). In addition, during the hearing, Apple played videotape excerpts from the deposition of third party witness Thomas J. Kowalski, Esq., of the firm Vedder Price P.C., who prosecuted the '345 patent. Tr. at 683:23-694:6.

## II. JURISDICTION

In order to have the power to decide a case, a court or agency must have both subject matter jurisdiction and jurisdiction over either the parties or the property involved. 19 U.S.C. § 1337; *Certain Steel Rod Treating Apparatus and Components Thereof*, Inv. No. 337-TA-97, Commission Memorandum Op., 215 U.S.P.Q. 229, 231 (1981).

### A. Subject Matter Jurisdiction

Section 337 confers subject matter jurisdiction on the International Trade Commission to investigate, and if appropriate, to provide a remedy for, unfair acts and unfair methods of competition in the importation, the sale for importation, or the sale after importation of articles into the United States. *See* 19 U.S.C. §§ 1337(a)(1)(B) and (a)(2). Apple does not contest subject matter jurisdiction, and Apple has stipulated to importing the following accused devices between January 1, 2016 and May 15, 2017:

- **iPhone:** iPhone 7 (A1660, A1778, A1779), iPhone 7 Plus (A1661, A1784, A1785), iPhone 6s (A1633, A1688, A1700), iPhone 6s Plus (A1634, A1687, A1699), iPhone SE

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(A1723, A1662, A1724), iPhone 6 (A1549, A1586, A1589), and iPhone 6 Plus (A1522, A1524, A1593);

- **iPad:** iPad Pro (12.9”) (A1584, A1652), iPad Pro (9.7”) (A1673, A1674, A1675), iPad Air 2 (A1566, A1567), iPad Air (A1474, A1475), iPad mini 4 (A1538, A1550), and iPad mini 2 (A1489, A1490);
- **iMac:** iMac 27” (A1419) and iMac 21.5” (A1418);
- **MacBook:** MacBook Air (A1465, A1466), MacBook (A1534), MacBook Pro 15” (A1707), MacBook Pro 13” (A1706), MacBook Pro 13” (A1708), MacBook Pro 15” (A1398), and MacBook Pro 13” (A1502);
- **Apple Watch:** Watch (A1604), Watch Series 1 (A1802, A1803), Watch Series 2 (A1757, A1758, A1816, A1817); and
- **Apple Headphones:** AirPods (B1888).

JX-0024C (Amended Joint Stipulation Regarding Importation and Inventory Between Andrea and Apple (Aug. 18, 2017)); *see also* RIB at 15 (“Apple does not contest the importation and *in rem* aspects of the Commission’s jurisdiction in this investigation.”).

Thus, I find that the Commission has subject matter jurisdiction over the articles accused in this investigation under section 337 of the Tariff Act of 1930. *See Amgen Inc. v. Int’l Trade Comm’n*, 565 F.3d 846, 854 (Fed. Cir. 2009) (“In this case, the Commission had jurisdiction as a result of Amgen’s allegation that Roche imported an article . . . covered by the claims of a valid and enforceable United States patent.”).

### **B. Personal Jurisdiction**

Apple responded to the Complaint and Notice of Investigation, participated in the investigation, appeared at hearings, and submitted pre- and post-hearing briefs. Thus, I find that Apple has submitted to the personal jurisdiction of the Commission. *See Certain Miniature Hacksaws*, Inv. No. 337-TA-237, USITC Pub. No. 1948, Initial Determination at 4, 1986 WL 379287, \*1 (Oct. 15, 1986), *unreviewed in relevant part*, Comm’n Action and Order, 1987 WL 450871 (Jan. 15, 1987).

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### C. *In Rem* Jurisdiction

The Commission has *in rem* jurisdiction over the accused products by virtue of Apple's concession that they have been imported into the United States. *See Sealed Air Corp. v. U.S. Int'l Trade Comm'n*, 645 F.2d 976, 985-86 (C.C.P.A. 1981) (holding that the ITC's jurisdiction over imported articles is sufficient to exclude such articles).

### III. STANDING

Apple argues that Andrea lacks standing to bring this suit without joining AND34 Funding LLC ("AND34"), a collateral agent for investors that gave money to Andrea in a common plan to monetize Andrea's patent portfolio, including the '345 patent. *See* RX-1158C, at 0001 ¶ 1; RX-0181C, Schedule I(a). For the reasons discussed below, I agree that Andrea lacks standing to assert the '345 patent as the sole complainant in this investigation, and I find that there is no violation of section 337 on that ground.

#### A. Legal Standards

Commission Rule 210.12 requires that intellectual property based complaints "include a showing that at least one complainant is the owner or exclusive licensee of the subject intellectual property." 19 C.F.R. § 210.12(a)(7). In determining whether this requirement is met, the Commission has applied the standing law established by courts in patent infringement cases. *See Certain Catalyst Components and Catalysts for the Polymerization of Olefins*, Inv. No. 337-TA-307, Comm'n Op., 1990 WL 710614, at \*15 (June 7, 1990) ("[W]e see little basis for inferring a different standing requirement under section 337 than the courts have established in patent infringement cases."). A complainant bears the burden to prove standing. *Certain Semiconductor Chips with Minimized Chip Package Size and Products Containing Same*, Inv. No. 337-TA-605, Initial Determination, 2008 WL 5626937, at \*10, \*14

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(December 1, 2008) (citing *Ortho Pharm. Corp. v. Genetics Institute, Inc.*, 52 F.3d 1026, 1033 (Fed. Cir. 1995)), *reviewed on other grounds*, Comm'n Op., 2009 WL 1520119 (May 20, 2009).

The standing issue involves determining the owner of all substantial rights in the patent. *See Certain Optical Disc Drives, Components Thereof, And Products Containing the Same* (“*Optical Disc Drives*”), Inv. No. 337-TA-897, Comm'n Op. at 4-10 (Jan. 7, 2015).<sup>3</sup> In this case, there is no dispute that Andrea holds title to the patent. Merely holding title is not dispositive, however. The courts and the Commission look beyond title to determine whether the plaintiff/complainant possess all substantial rights. *See, e.g., Diamond Coating Techs., LLC v. Hyundai Motor America*, 823 F.3d 615, 618 (Fed. Cir. 2016) (stating that the question is whether the plaintiff/transferee received “all substantial rights in the patents-in-suit or, instead, whether [the transferor] retained substantial rights”). A plaintiff or complainant who lacks all substantial rights cannot sue without joining the party or parties who share the rights in the patent, and when those parties cannot be joined, the case will be dismissed. *See Alps South, LLC v. Ohio Willow Wood Co.*, 787 F.3d 1379, 1383 (Fed. Cir. 2015) (holding that plaintiff lacked standing where license agreement limited the “right to ‘develop, make, have made, use, sell, offer to sell, distribute, lease, and import’ products covered” by the patent); *Pi-Net Int'l, Inc. v. Focus Bus. Bank*, Case No. 5:12-cv-04958-PSG, 2015 WL 1538259 at \*4 (N.D. Cal. Apr. 6, 2015) (“Pi-Net therefore lacks legal capacity to maintain these actions because it does

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<sup>3</sup> There were two initial determinations in the 897 investigation that ultimately resulted in the entire investigation being terminated for lack of standing. *Optical Disc Drives*, Comm'n Op. at 5 (June 15, 2015). On review of the first ID, the ALJ's decision on standing was affirmed with respect to some patents and remanded with respect to others. *Optical Disc Drives*, Comm'n Op. at 3 (Jan. 7, 2015). On review of the ALJ's decision on remand, the Commission approved the ALJ's analysis concerning lack of standing with respect to the remaining patents and terminated the investigation. *Optical Disc Drives*, Comm'n Op. at 5 (June 15, 2015). In the remainder of this discussion of standing, “Comm'n Op.” refers to the January 7, 2015 decision.

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not hold ‘all substantial rights’ to the asserted patents . . . .”) (citing *Morrow v. Microsoft Corp.*, 499 F.3d 1332, 1340-41 (Fed. Cir. 2007)); *Optical Disc Drives*, Comm’n Op. at 11 (“[I]n section 337 investigations based on patent infringement all parties necessary to establish the standing requirement must be joined.”) (citing *Alfred E. Mann Foundation for Scientific Research v. Cochlear Corp.*, 604 F.3d 1354, 1360 (Fed. Cir. 2010)). What matters, moreover, is not the label that is attached to one party or the other, but the substance of the rights in the patent held by each party. *Optical Disc Drives*, Comm’n Op. at 9 (citing *Morrow v. Microsoft Corp.*, 499 F.3d 1332, 1340 n.7 (Fed. Cir. 2007)). See *Diamond Coating*, 823 F.3d at 618 (“We have not allowed labels to control. . . .”).<sup>4</sup>

In *Azure Networks v. CSR PLC*, the Federal Circuit enumerated a non-exhaustive list of factors to be considered to decide whether a plaintiff has standing to sue under the Patent Act.

- 1) the nature and scope of the right to bring suit;
- 2) the exclusive right to make, use, and sell products or services under the patent;
- 3) the scope of the licensee's right to sublicense;
- 4) the reversionary rights to the licensor following termination or expiration of the license;
- 5) the right of the licensor to receive a portion of the proceeds from litigating or licensing the patent;
- 6) the duration of the license rights;
- 7) the ability of the licensor to supervise and control the licensee's activities;

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<sup>4</sup> As the Federal Circuit explained, a patent “is, in effect, a bundle of rights which may be divided and assigned, or retained in whole or part.” *Vaupel Textilmaschinen KG v. Meccanica Euro Italia SPA*, 944 F.2d 870, 875 (Fed. Cir. 1991).

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- 8) the obligation of the licensor to continue paying maintenance fees; and
- 9) any limits on the licensee's right to assign its interests in the patent.

771 F.3d 1336, 1343 (Fed. Cir. 2014) (citing *Mann*, 604 F.3d at 1360-61), *judgment vacated on other grounds*, *CSR PLC et.al. v. Azure Networks*, 135 S. Ct. 1846, 2015 WL 582818 (Apr. 20, 2015). The Federal Circuit continues to cite *Azure* in analyzing patent standing, *see Diamond Coating Technologies, LLC v. Hyundai Motor America*, 823 F.3d 615, 620 (Fed. Cir. 2016), and the *Azure* factors were adopted by the Commission in the 897 investigation. *See Optical Disc Drives*, Comm'n Op. at 10.

The case law shows that standing issues have arisen in a variety of factual contexts.<sup>5</sup> The doctrine that a plaintiff or complainant must possess all substantial rights to sue on its own applies not only where there is a license agreement or other formal transfer of rights, but in other circumstances where patent rights have been divided or diminished by contractual obligations. Thus, in *Enhanced Security Research, LLC v. Juniper Networks, Inc.*, the district court held that a plaintiff who entered into a “purchase Agreement” with a litigation finance/investment firm gave away too many rights to sustain standing on its own. Case No. 09-871-JJF, 2010 WL 2898298, at \*1-5 (D. Del. July 20, 2010), *aff'd per curiam*, 433 Fed. Appx. 902 (Fed. Cir. June 14, 2011). The investment firm’s authority “to make decisions

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<sup>5</sup> As the Circuit stated in *Mann*, regardless of the direction of the transaction, the pertinent question is whether the plaintiff/complainant has sufficient rights to enforce the patent. *Mann*, 604 F.3d at 1359 (“Typically, we are confronted with cases in which an exclusive licensee sues an accused infringer, and we must decide whether the licensee has been granted rights sufficient to confer standing. This case presents a converse scenario in which the patent owner seeks to bring suit, requiring us to determine whether the patent owner transferred away sufficient rights to divest it of any right to sue.”).

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concerning licensing and assignments, whether to initiate enforcement proceedings and/or settlement discussions, how to conduct litigation, and the approval of any settlements” deprived the plaintiff of standing to sue. *Id.*

Similarly, in *Optical Disc Drives*, the Commission terminated an investigation for lack of standing because the complainant/assignee did not possess all substantial patent rights. The Commission explained that “in evaluating the substance of the [plaintiff/complainant’s] right, a court may find that an exclusive licensee was not afforded sufficient rights to confer standing; that an assignee transferred away too many rights, thus divesting it of its right to sue; or that an assignee never received sufficient rights to sue alone.” *Optical Disc Drives*, Comm’n Op. at 9. The Commission cited *Certain Devices with Secure Commc’n Capabilities, Components Thereof, and Products Containing Same*, Inv. No. 337-TA-818, Order No. 15, 2012 WL 7857467, at \*1-2 (Jul. 18, 2012), where the “ALJ found that, although complainant obtained rights to a patent pursuant to an agreement, it lacks standing to sue in its own name because it lacked all substantial rights.” *Id.* at 9. The Commission noted that the ALJ found that the licensor “ ‘retain[ed] the right to review and object to any proposed license, assignment, or settlement involving’ the patent, and retained ‘an equity interest in any proceeds from licensing’ the patent and proceedings from related litigation.” *Id.* at 9-10. The Commission terminated the 818 investigation based on lack of patent standing. *Id.* at 10.

The factors pertinent to the Commission’s decision in *Optical Disc Drives* were the nature and scope of the complainant’s rights to bring suit, the scope of the complainant’s right to sublicense, the non-party’s right to receive a portion of the recovery infringement suits, the non-party’s ability to supervise and control the complainant’s activities, and the nature of any limits on the complainant’s right to assign its interest in the patent. *Id.* at 17-18. The question

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that must be decided in this case, therefore, is whether Andrea has retained all substantial rights in the asserted patents or whether, like the complainant in the 897 investigation, Andrea has transferred substantial patent rights to AND34. For the reasons discussed below, I conclude that Andrea lacks all substantial rights due to the restrictions set forth in its agreements with AND34.

### **B. Applying Standing Analysis to Andrea**

In 2014, Andrea entered into a revenue sharing and note purchase agreement (the “revenue sharing agreement”) under which Andrea received substantial funds from financial institutions using AND34 as the collateral agent. The currently operative revenue-sharing agreement is RX-0181C.<sup>6</sup> The revenue-sharing agreement on its face and in all of its particulars meets *Azure* factor number 5, concerning the right “to receive a portion of the proceeds from litigating or licensing the patent.” AND34 unquestionably has the right to receive a portion of the litigation and licensing proceeds related to the patent. *See* RX-0181C at 0016-17, ¶ 2.1.2.

Further, under the revenue-sharing agreement, Andrea is required to monetize the ’345 patent by seeking to enforce it against leading mobile device companies, [REDACTED]. *See* RX-0309C; Tr. 113:14-114:8.<sup>7</sup> This requirement significantly diminishes Andrea’s exclusive right as patentee to sue infringers and license the patent. Andrea may enforce the patent against others not named in RX-0309C, but it must sue (or threaten to sue) the entities listed there. *See*

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<sup>6</sup> A rider to the revenue sharing agreement dated August 10, 2016 increases the funding of Andrea’s patent monetization efforts but does not materially change the pertinent terms of the parties’ agreement. *See* RX-0146C.

<sup>7</sup> The listed companies are [REDACTED].  
[REDACTED] RX-0309C.



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RX-0181C at 0026, ¶ 6.2. Similarly, Andrea must license to those entities, if they agree to take a license as a result of Andrea's enforcement efforts. While this provision does not prevent Andrea from enforcing the patent against other parties, it deprives Andrea of the unfettered right to choose whom to sue and license to by requiring that the patent be enforced against the listed companies. See *Azure* factor number 1 (nature and scope of the right to bring suit); *Diamond Coating*, 823 F.3d at 621 (finding lack of standing where non-party "retained significant control over [plaintiff's] enforcement and litigation activities").

In addition, if Andrea wished to engage in a collaboration with one of the 22 companies listed on RX-0309C to develop a product using the patent, it could not do so. With respect to the ■ leading mobile device companies listed, Andrea is contractually obligated to monetize the patents, not to develop them. See RX-0181C at 26, ¶ 6.2 ("The Company shall use commercially reasonable efforts to pursue the monetization of the Patents, and shall use best efforts to diligently pursue the monetization of the Patents through pursuit of Monetization Revenues from the Potential Business Partners . . ."). Andrea's potential "business partners" are the companies listed in RX-0309C. Monetization activities are limited to "any activities necessary or desirable to generate revenue . . . by means ■" ■" RX-0181C at 0054 (definition of "Monetization Activities"). Indeed, Andrea is barred expressly under the revenue-sharing agreement from practicing the '345 patent to manufacture or sell certain products to the targets of the monetization program without AND34's consent. *Id.* at 0032, ¶ 6.13; Tr. 114:16-115:4, 115:20-116:6 ("I would have to get consent for anything new.").<sup>8</sup>

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<sup>8</sup> Paragraph 6.13 of the agreement states: "Agreements with Potential Business Partners. The Company shall not enter into any agreement to manufacture and sell any new physical hardware

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Andrea is severely restricted in its ability to dispose of or convey rights in the '345 patent. Paragraph 6.9.1 of the revenue sharing agreement states: “Dispositions. The Company shall not make any Disposition of any Patents other than (i) entering into settlement agreements or non-exclusive licensing arrangements with respect to the patents in connection with the performance of its obligations under Section 6.2. . . .” RX-0181C at 0029, ¶ 6.9.1. Andrea’s right to sublicense the patents is subject to many conditions dictated by AND34. *See id.* at 0030, ¶ 6.9.1 (prohibiting sublicenses to any Potential Business Partner); *see also Azure* factor number 3 (scope of the right to sublicense). Thus, Andrea has ceded to AND34 not only significant control over the assertion of the patent, but also over the use of the patented technology. *See Azure* factor number 2 (exclusive right to make, use, and sell products or services under the patent).

Andrea and AND34’s protestations that AND34 does not control Andrea’s use of the '345 patent are unavailing in light of paragraph 6.2 and other pertinent provisions of the revenue-sharing agreement. Whether or not AND34 actually controls Andrea’s use of the patent, it has the right to do so under the legally binding revenue-sharing agreement.<sup>9</sup>

In addition, Andrea and AND34 share control over litigation strategy. Exhibit RX-0319C is a “Common Interest and Nondisclosure Agreement” (the “common interest agreement”)

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products covered by the Patents to a Potential Business Partner or to sell any made-to-specification software covered by the Patents to a Potential Business Partner, in each case without the prior written consent of the Majority Purchasers (as determined in their sole and absolute discretion).” The purpose of this provision is to protect AND34’s patent revenue stream. Tr. at 116:7-14.

<sup>9</sup> Failure to abide by paragraph 6.2 may result in a default. Upon the occurrence of a default, Andrea may be required to relinquish the patents to AND34. *See* RX-0181C at 0026, ¶ 6.2, at 0035, ¶ 7.3; RX-2328C (patent assignment executed by Andrea).

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between the “Parties,” which are Andrea and AND34 (RX-0319C at 0001, preamble). This document refutes conclusively Andrea’s assertion that AND34 does not control Andrea’s patent assertion activities. The common interest agreement recites that “one or more of the Parties, or others on its behalf, may assert certain intellectual property rights owned or licensed by one or more of the Parties” and that “each of the Parties has a common interest” in the agreement between Andrea and AND34 and “in determining courses of action, in preparing litigation strategies and in the assertion” of the intellectual property rights. RX-0319C at 1. The common interest agreement states further that “the Parties desire to participate in a common strategy with respect to their assertion of the Intellectual Property Rights against other entities.” *Id.* No more than this agreement is required to confirm that AND34 controls “the nature and scope” of Andrea’s right to bring suit, *Azure* factor number 1, and has the ability to supervise and control Andrea’s activities with respect to the ’345 patent, *Azure* factor number 7. *See* RX-0319C at 0003, ¶ 8 (“Common interest information obtained pursuant to this Agreement shall be used solely in connection with the Parties’ joint pursuit of the Common Interest . . .”).

This agreement confirms further that the relationship between Andrea and AND34 is not merely that of creditor/lender, but rather is in the nature of a joint venture to monetize the ’345 patent, in which both parties participate and in which Andrea is substantially powerless to act without the acquiescence of AND34. The common interest agreement also gives the lie to the self-serving statement in paragraph 6.5 of the revenue sharing agreement that “under no circumstances shall [AND34] have any right to direct or control [Andrea’s] monetization efforts.” RX-0181C at 0028, ¶ 6.5.<sup>10</sup>

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<sup>10</sup> In addition to the provisions discussed above, Apple points to several paragraphs of the revenue-sharing agreement that restrict Andrea’s ability sell or assign the patents. *See* RIB 21-

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Under the Federal Circuit's most recent formulation of the standing criteria, the key factors are the exclusive right to make, use, and sell, to license, and to sue accused infringers. *Diamond Coating*, 823 F.3d at 619. As discussed above, Andrea has ceded substantial rights in each of these vital areas to AND34, to such an extent that it cannot be considered the sole owner of the patent for standing purposes.

### **C. Andrea's arguments are unavailing.**

Andrea asserts that it has standing because AND34 does not have all substantial rights in the patent. *See* CRB at 5 (“The question is whether AND34 has obtained all substantial rights, which it has not.”). Andrea's arguments focus on the wrong party. The issue is whether Andrea, the complainant, has standing, not whether AND34 has standing. That one party lacks standing does not mean that another party necessarily has standing. Where rights are divided, it is quite possible that neither party possesses all substantial rights. *See Aspex Eyewear, Inc. v. Miracle Optics, Inc.*, 434 F.3d 1336, 1344 (Fed. Cir. 2006) (“Even though the lawsuit was properly brought in the name of the owner of the patent, we must still determine whether the action as brought by appellants included all necessary parties.”). In such a case, as discussed above, neither of the parties can sue without joining the other.

Andrea cites *Mann* for the proposition that the question is either/or—either the licensor or the licensee has standing. CRB at 4. But the particular quotation from *Mann* that Andrea relies on relates to the concept of constitutional standing, *see Luminara Worldwide, LLC v. Liown Electronics Co. Ltd.*, Case No. 14-cv-3103 (SRN/FLN), 2015 WL 11018002 at \*10 (D. Minn.

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22. Such provisions on their own could be indicative of nothing more than a lender's desire to secure its collateral, and I do not rely upon them in reaching the decision that Andrea lacks standing.

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Apr. 20, 2015) (discussing the requirement for demonstrating the transfer of legal title to a patent as “constitutional standing”), while the question in the case before me is whether Andrea, which is without dispute the patent’s legal owner, satisfies the statutory criteria for standing by possessing all substantial rights in the patent. *See Optical Disc Drives*, Comm’n Op. at 10 (listing the *Azure* factors as determinative).<sup>11</sup>

Andrea asserts that AND34 does not possess the right to direct Andrea’s litigation activities and that the relationship between the parties is merely that of a borrower and lender. CRB at 3-4. As described above, however, the contractual provisions of the revenue-sharing agreement and the common interest agreement extend far beyond the terms and conditions that are sufficient to secure collateral.

Andrea and Staff rely on the decision in the 949 investigation. Their reliance is misplaced for several reasons.

First, the 949 decision dwells on the question whether AND34 has “an exclusive or nonexclusive license to the asserted patents.” *Certain Audio Processing Hardware and Software and Products Containing the Same*, Inv. No. 337-TA-949, Initial Determination at 7 (June 11, 2015) (unreviewed). This is part of the standing inquiry, but it is not the question that

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<sup>11</sup> The statutory standing criteria formerly were regarded as prudential considerations. *See Luminara*, 2015 WL 11018002 at \*10. As noted by the Commission in *Optical Disc Drives*, Comm’n Op. at 4, the Federal Circuit in *Vaillancourt v. Becton Dickinson & Co.*, 749 F.3d 1368, 1368-69 (Fed. Cir. 2014), recognized that the Supreme Court in *Lexmark Int’l, Inc. v. Static Control Components, Inc.*, 134 S.Ct. 1377 (2014) had “clarified that some issues often discussed in ‘standing’ terms are better viewed as interpretations of a statutory cause of action.” There is no suggestion in any of the case law that the considerations formerly labeled “prudential” have been eliminated from standing analysis, and the Federal Circuit, the courts and the Commission, as discussed above, have continued to apply them. *See Diamond Coating*, 823 F.3d at 620; *Alps South*, 787 F.3d at 1382 (“[W]e must also satisfy ourselves that in addition to Article III standing, the plaintiff also possessed standing as defined by § 281 of the Patent Act.”); *Optical Disc Drives*, Comm’n Op. at 4.

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determines whether Andrea has all substantial rights in the patents. As noted above, the question of whether a license is exclusive or non-exclusive goes to legal title (*i.e.*, constitutional standing), which is not in dispute in this case. The 949 decision's discussion of whether AND34 is an exclusive licensee does not address the matter in dispute here: does Andrea, the patent's titular owner, have all substantial rights? See *Optical Disc Drives*, Comm'n Op. at 11 ("Specifically, the ALJ correctly noted, '[g]iven that rights contained in a patent may be conferred separately on different entities, the critical inquiry is whether the complaining party has' enough rights to be considered the patent owner."). The statutory standing question must be addressed to complete the analysis of standing under the Patent Act. See *id.* at 4 (stating that complainants under section 337 "must satisfy constitutional standing and statutory cause of action requirements for the Commission to hear their claim").

The 949 decision does not fully address the legal factors deemed critical to standing by the Federal Circuit and the Commission. Further, pertinent facts relevant to the statutory standing criteria, discussed above, are not addressed in the 949 decision. If these facts even were in the record, they were not considered. There is no mention, for example, of the common interest agreement between Andrea and AND34. As discussed, the facts in this record demonstrate that Andrea shares revenues derived from litigating or licensing the patents with AND34, that Andrea must seek to enforce the patents in litigation and licensing activities and is not free to choose whom to target in its patent enforcement efforts, that Andrea cannot license to any of the leading companies in its field except pursuant to the joint monetization program that binds Andrea to AND34, that Andrea cannot make or sell certain products to the industry leaders without AND34's consent, that Andrea cannot sublicense except subject to the terms of the revenue-sharing agreement, that Andrea cannot dispose of the patents except as directed by the

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revenue-sharing agreement, and that Andrea cannot determine litigation strategy or assert intellectual property rights independently of AND34, its strategic partner. These facts cannot be ignored, given their criticality to the standing factors identified in the case law.

Staff asserts that, “Andrea can only lose standing by transferring ownership of the ’345 patent to another party.” SRB at 8. This assertion contradicts black letter law requiring a complainant to show not only legal title but possession of all substantial rights, in order to establish standing. Under the law, including under Commission precedent, Andrea plainly does not need to transfer ownership to divest itself of standing. It can lose standing by giving up substantial rights in the patent to another party, without giving up legal ownership.

Staff maintains that, “The Commission [has] determined that Andrea has standing to assert the ’345 patent.” SIB at 8. But Staff does not argue, nor could it, that the 949 decision is *res judicata* or has any preclusive effect on this case, in which different parties make different arguments and present different evidence.<sup>12</sup> The 949 decision did not address statutory standing and makes no mention of the critical facts that demonstrate that Andrea lacks standing to prosecute the ’345 patent on its own. As discussed above, these critical facts preclude Andrea from asserting the ’345 patent without joining AND34.

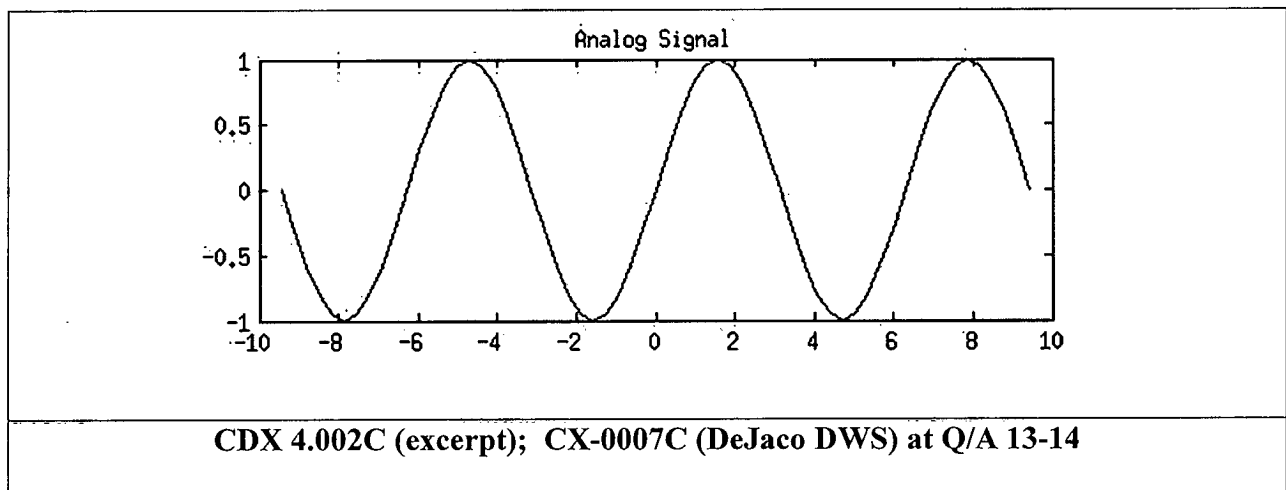
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<sup>12</sup> The doctrine of *res judicata* “provides that when a court of competent jurisdiction has entered a final judgment on the merits of a cause of action, *the parties to the suit and their privies* are thereafter bound ‘not only as to every matter which was offered and received to sustain or defeat the claim or demand, but as to any other admissible matter which might have been offered for that purpose. . . . The judgment puts an end to the cause of action, which cannot again be brought into litigation *between the parties* upon any ground whatever, absent fraud or some other factor invalidating the judgment.” *C.I.R. v. Sunnen*, 333 U.S. 591, 597 (1948) (emphasis added); *see also VastFame Camera, Ltd. v. Int’l Trade Comm’n*, 386 F.3d 1108, 1115 n. 2 (Fed. Cir. 2004) (“[T]his is not a case where any form of preclusion is appropriate. Vastfame was not a party to the Initial Investigation before the Commission and, thus, did not have a prior opportunity to raise the invalidity issue it now seeks to present.”).

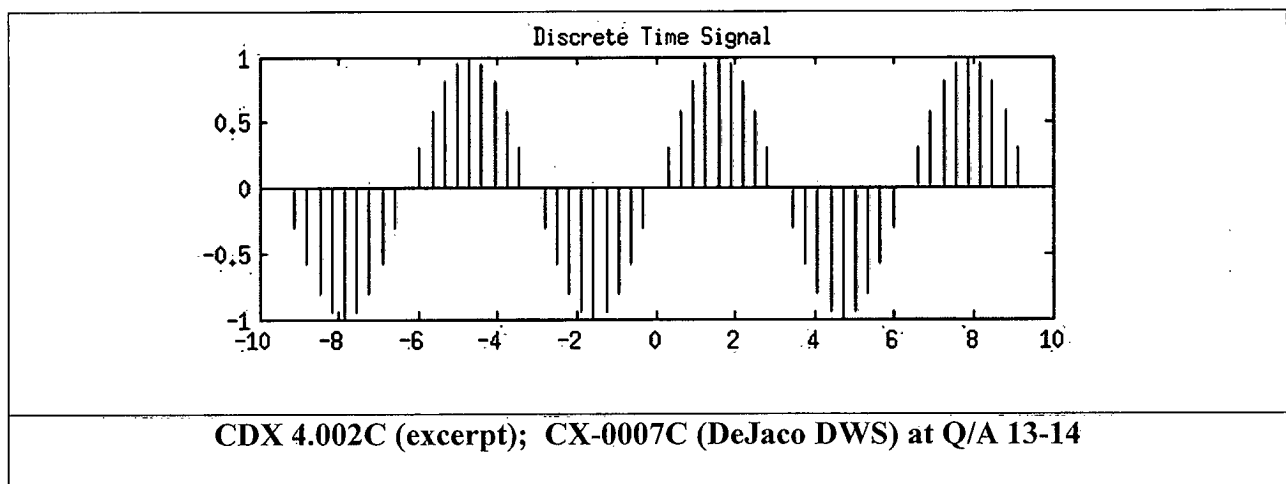
#### IV. TECHNOLOGY AND PATENT AT ISSUE

##### A. Technological Background

Sound is the propagation of vibrations through a medium, such as air. CX-0007C (DeJaco DWS) at Q/A 13. A soundwave can be picked up by a microphone by causing the diaphragm in a microphone to vibrate. *Id.* The diaphragm is connected to an electrical circuit, and the diaphragm's vibration causes fluctuations in the voltage in the circuit. *Id.* When plotted against time, the fluctuations in voltage provide an analog representation of the sound wave.



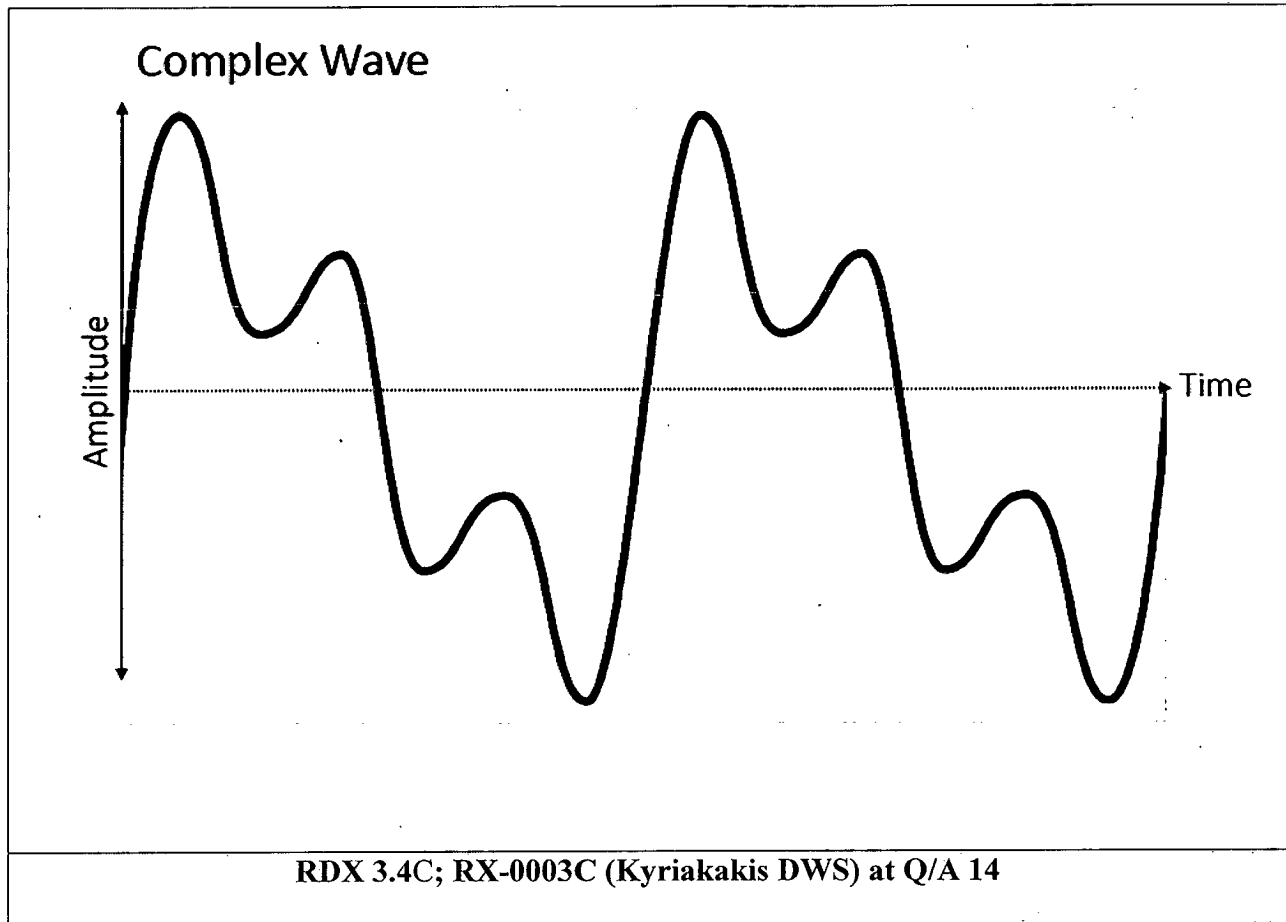
An analog representation can be converted to digital by sampling it at various points.





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The sound waves shown above represent a single frequency. Audio signals, however, are typically composed of multiple frequencies forming a complex waveform.

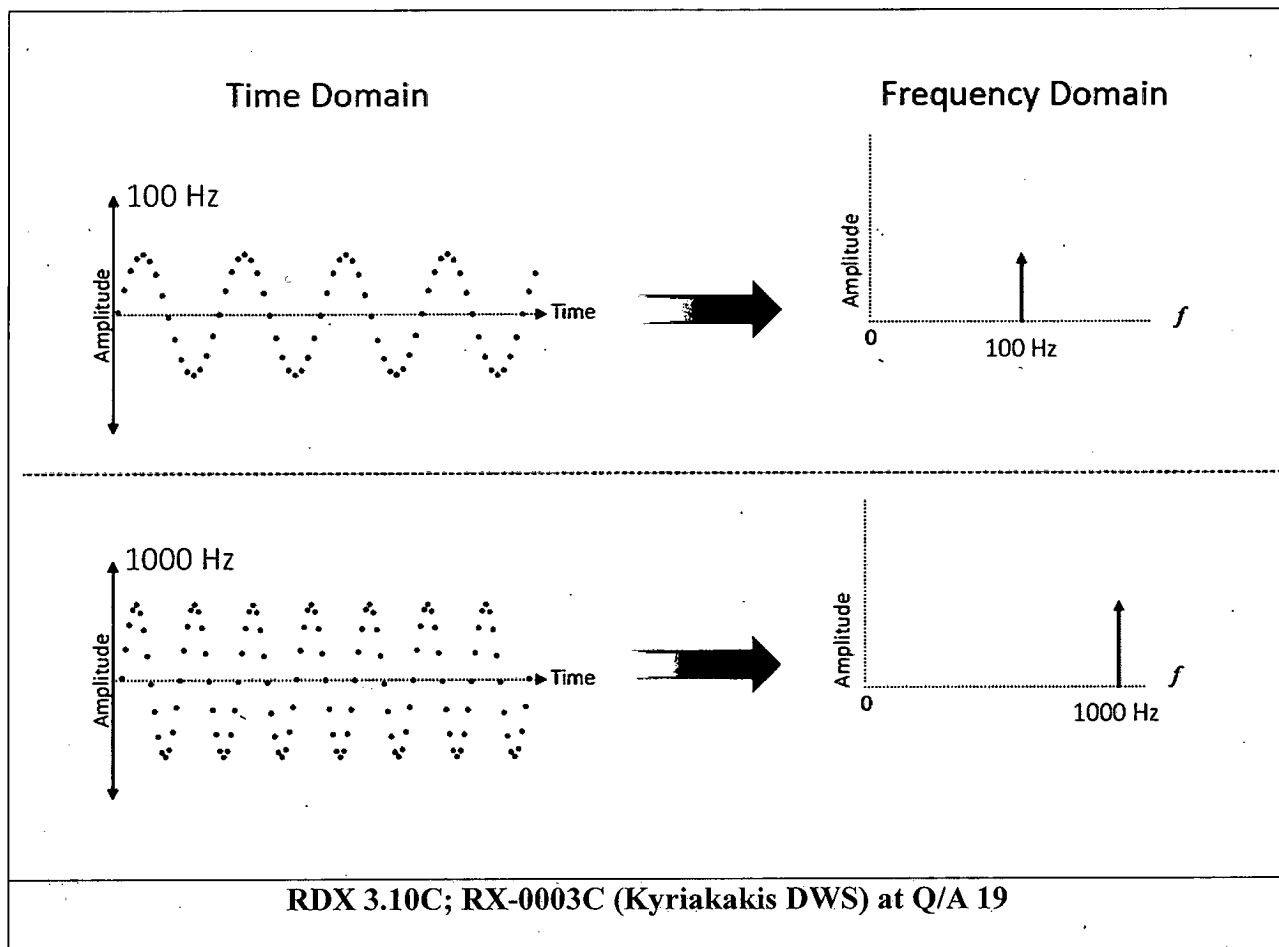


Audio signals can be analyzed with respect to time (time-domain analysis) or frequency (frequency-domain analysis). When a signal is plotted against time, as it is in the graph above, it is being analyzed in the time domain. In the time domain, changes in the signal's amplitude are shown over time. RX-0003C (Kyriakakis DWS) at Q/A 17-18. A signal in the time domain is a representation of the actual physical sound wave as it changes over time, which can be picked up by a microphone or played over a loudspeaker. *Id.*

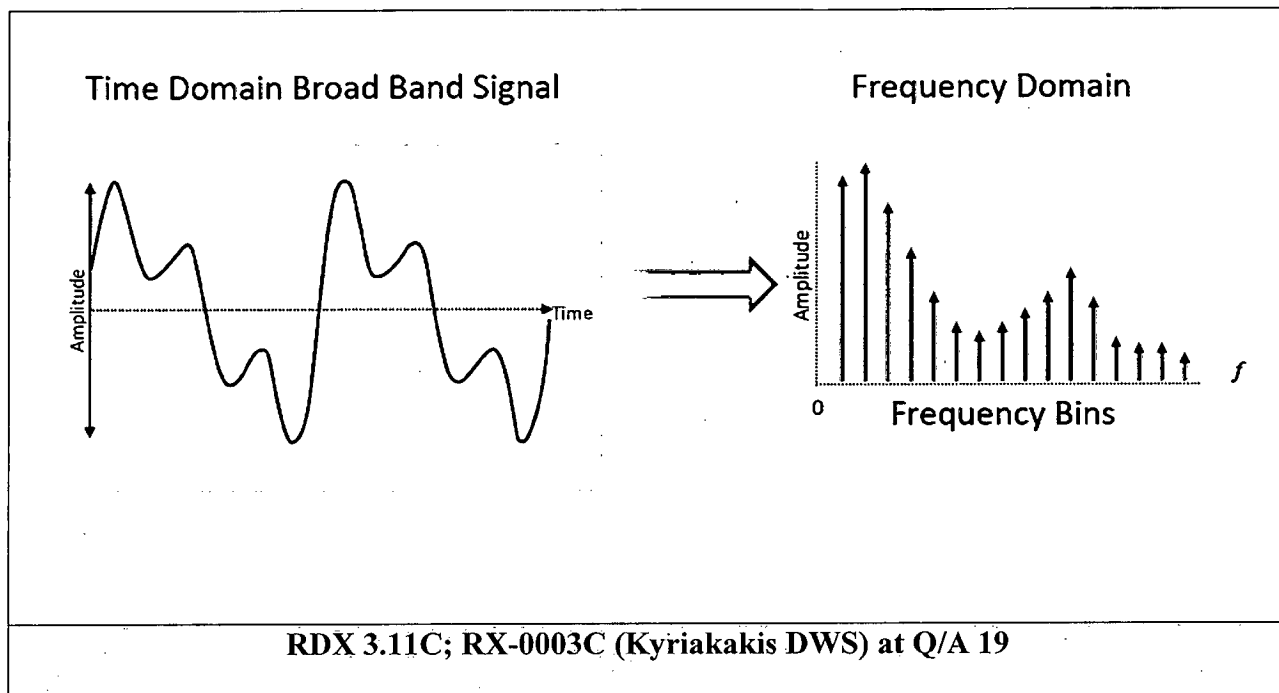
Audio signals can also be analyzed in the frequency domain, as well as the time domain. *Id.* at Q/A 15, 17. In order to analyze a signal in the frequency domain, the time domain signal is

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transformed into a representation of the frequency components contained in the signal within a given time window. *Id.* at Q/A 19. In the figure below, two simple wave forms depicting single frequencies are transformed from the time domain to the frequency domain.

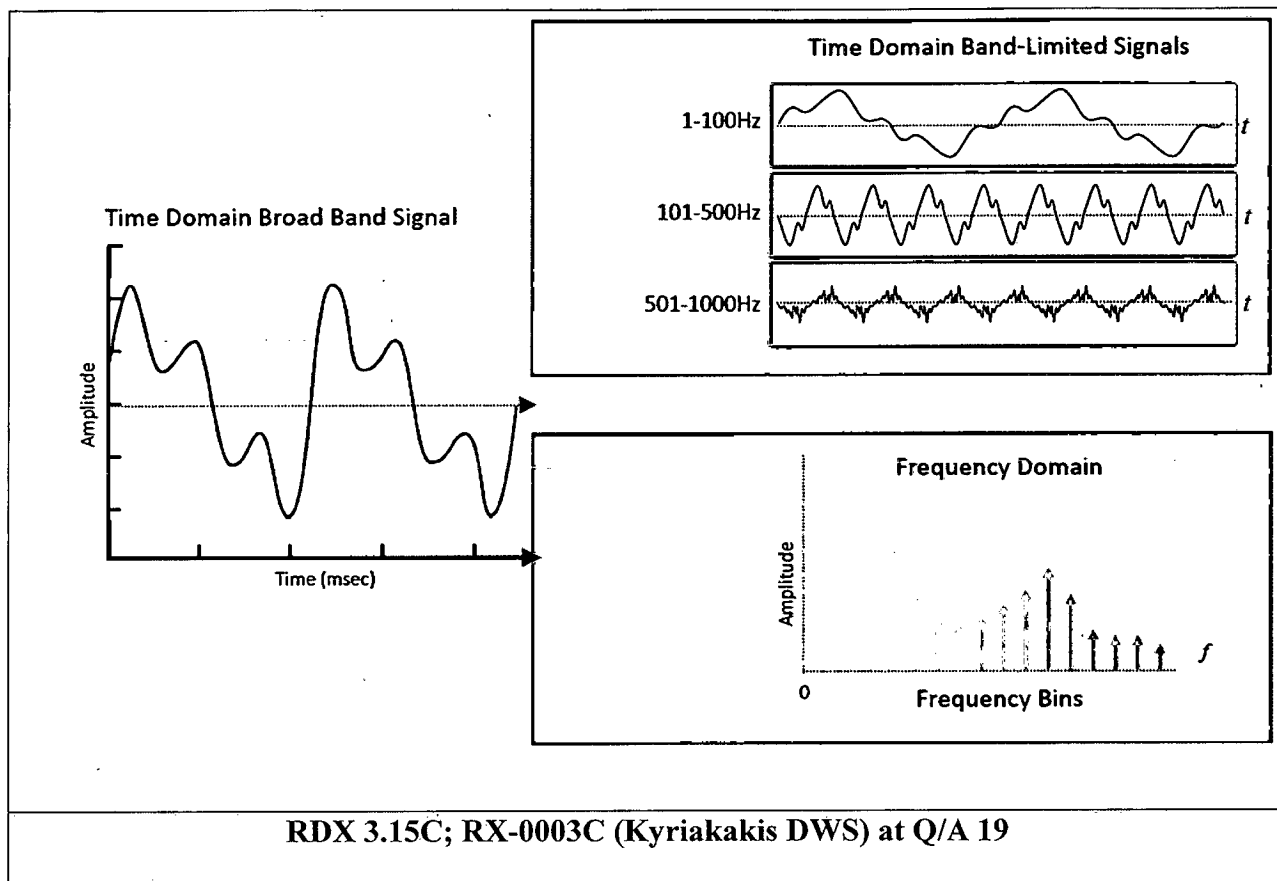


The vertical arrows in the histograms on the right represent the amplitude of the signal at each frequency. *Id.* A complex wave comprised of multiple frequency components will have multiple values in the frequency domain, each value representing the amplitude of a different frequency component appearing in the signal during a given time window.



One common method of converting a signal from the time domain to the frequency domain is the Fourier transform. RX-0003C (Kyriakakis DWS) at Q/A 19.

Another method for processing signals is to split the signal into a series of time-domain sub-bands as shown in the top graph on the right in the figure below.



## B. The '345 Patent

The '345 patent is the sole remaining patent in this investigation. The '345 patent is entitled "System, Method and Apparatus for Cancelling Noise" and issued on March 26, 2002, from an application filed on February 18, 1999. JX-0001. The '345 patent identifies Joseph Marash and Baruch Berdugo as inventors. *Id.*

### 1. Claims

Andrea is asserting that Apple infringes claims 4-11, 13-16, 21, 23-25, 38-40, 43, and 46 of the '345 patent. Andrea is also asserting that its domestic industry products practice claims 4-11, 13, 14, 17, 21, 23, 25, 38-40, 43, 46, and 47. Claims 4-11, 13-17, 21, and 23-25 depend from unasserted independent claim 1; claims 39, 40, 43, 46, and 47 depend from asserted independent

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claim 38. Claim 1 and its dependents are apparatus claims; claim 38 and its dependents are method claims.

Claim 1 recites:

An apparatus for canceling noise, comprising:

an input for inputting an audio signal which includes a noise signal;

a frequency spectrum generator for generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal; and

a threshold detector for setting a threshold for each frequency bin using a noise estimation process and for detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold, thereby detecting the position of noise elements for each frequency bin.

JX-0001 ('345 patent) at col. 9:35-46.

Claim 4 requires that the threshold detector be able to set the threshold for each frequency bin with the bin's current minimum value of magnitude, which is derived from the bin's future minimum value of magnitude. *Id.* at col. 9:54-60. Claims 5-11 place limitations on the determination and setting of the current and future minimum values of magnitude. *Id.* at col. 9:61-col. 10:18. Claim 13 requires a "subtractor for subtracting said noise elements estimated at said positions determined by said threshold detector from said audio signal to derive said audio signal substantially without said noise." *Id.* at col. 10:25-29. Claims 14-16 place limitations on the subtractor. *Id.* at col. 10:30-38. Claim 17 further requires "a residual noise processor for reducing residual noise" after the signal is processed by the subtractor. *Id.* at col. 10:39-43. Claim 18 places limitations on the residual noise processor. *Id.* at col. 10:44-54. Claim 21 requires "an estimator for estimating a magnitude of each frequency bin." *Id.* at col. 10:55-57. Claim 23 requires a "smoothing unit" for smoothing the estimated magnitudes. *Id.* at col. 10:63-65. Claim 24 places limitations on the smoothing unit. *Id.* at col. 10:66-col. 11:4. Claim 25

requires “an adaptive array comprising a plurality of microphones for receiving” the audio signal. *Id.* at col. 11:5-7. The limitations of claims 38-40 and 42-47 are method steps, but are otherwise similar to the limitations found in claims 1, 4, 5, 13, 14, 17, 21, 23, and 25.

## 2. Specification

The specification of the '345 patent discloses a method and apparatus for performing noise cancellation and reduction using spectral subtraction. '345 patent, col. 1:19-21. Ambient noise degrades the performance of speech processing algorithms, such as those used in dictation, voice activation, and voice compression systems. *Id.* at col. 1:27-28. While adaptive beamforming microphone arrays can cancel directional noise, they are unable to effectively cancel diffused noise. *Id.* at col. 1:38-45. Diffused noise occurs in environments that are highly reverberant. *Id.* at col. 1:49-52. One example of such an environment is a room that has walls that strongly reflect sounds, so that the reflected sounds reach the array from an infinite number of directions. *Id.* at col. 1:49-52. Another example is the cabin of an automobile, where noise radiates from the car chassis. *Id.* at col. 1:52-54.

“Spectral subtraction” is used to cancel diffused noise. *Id.* at col. 1:58-60. Spectral subtraction is a prior art method in which a voice switch is used to detect non-speech time intervals. *Id.* at col. 1:60-64. The “Background of the Invention” section of the '345 patent describes the prior art method of spectral subtraction disclosed in “Suppression of Acoustic Noise in Speech Using Spectral Subtraction,” by Steven F. Boll (“Boll”) (RX-0056). '345 patent at col. 1:64-col. 2:1.

In the method disclosed in Boll, a digital signal is converted from the time domain to the frequency domain by a Fast Fourier Transform (“FFT”). RX-0056 at 0004 (“The DFT of each data window is taken and the magnitude is computed. Since real data are being transformed, two

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data windows can be transformed using one FFT [.]” and Fig. 3 (“FFT”); *see also* RX-0003C (Kyriakakis DWS) at Q/A 36; ’345 patent at col. 2:11-14 (“More particularly, the noise magnitude spectrum is estimated by performing an FFT of 256 points of the non-speech time intervals and computing the energy of each frequency bin.”). Boll then estimates the noise present in each frequency bin and subtracts the estimated noise. RX-0056 at 0004 (“The spectral subtraction method requires an estimate at each frequency bin of the expected value of noise magnitude spectrum . . . .”) and Fig. 3 (“Compute Magnitude” and “Subtract Bias”); *see also* ’345 patent at col. 2:29-31 (“The noise magnitude spectrum is then subtracted from the signal magnitude.”); RX-0003C (Kyriakakis DWS) at Q/A 36. After the subtraction process, residual noise is removed from the frequency bin and the signal is converted back to the time domain using an Inverse Fast Fourier Transform (“IFFT”). RX-0056 at 0003 (“G. Noise Residual Reduction”), 0005 (“After bias removal rectification residual noise removal and nonspeech signal suppression time waveform is reconstructed from the modified magnitude corresponding to the center window.”), and Fig. 3 (“Reduce Noise Residual” and “IFFT”); *see also* ’345 patent at col. 40-42 (“An IFFT process is then performed on the complex data to obtain the noise free time domain data.”); RX-0003C (Kyriakakis DWS) at Q/A 36.

Although the patent describes the method disclosed in Boll as providing “good results for stationary diffused noises that are not correlated with the speech signal,” it identifies several deficiencies. ’345 patent at col. 1:64-2:1, col. 2:45-58. One of the criticisms is that the method relies on a voice switch to accurately identify non-speech time intervals, which is “difficult to achieve or obtain in real time systems.” *Id.* at col. 2:5-10. The voice switch detects the presence of speech by measuring the energy level and comparing it to a threshold. *Id.* at col. 2:49-51. If the threshold is too high, some voice time intervals might be incorrectly identified as non-speech

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time intervals, resulting in voice distortion, especially in poor signal-to-noise ratio cases. *Id.* at col. 2:51-54. Conversely, if the threshold is too low, there will be a risk that non-speech intervals will be too short to generate an accurate estimate of the noise. *Id.* at col. 2:55-58.

The purported invention of the '345 patent seeks to eliminate the need for a voice switch by “determining the non-speech segments using a separate threshold detector for each frequency bin.” *Id.* at col. 3:29-31. The threshold detectors detect the positions of the noise elements by determining whether frequency bins of the input signal are less than a corresponding threshold. *Id.* at col. 3:31-37.

### **C. Level of Ordinary Skill in the Art**

Andrea asserts that a person of ordinary skill in the art of the '345 patent would have had “(1) an undergraduate degree in computer science, electrical engineering, computer engineering, or a similar degree, with introductory course work in digital signal processing and approximately three years of experience in developing and implementing digital signal processing algorithms and systems; or (2) a master’s degree in computer science, electrical engineering, computer engineering, or similar degree with a focus on digital signal processing and approximately one year of experience in developing and implementing digital signal processing algorithms and systems.” CX-1888C (Douglas RWS) at Q/A 14. Apple’s expert applied Andrea’s definition of the level of ordinary skill in the art. RX-0003C (Kyriakakis DWS) at Q/A 121. Staff argues that there is no basis for departing from the level of ordinary skill adopted in the 949 Investigation, and argues that a person of ordinary would have had “(1) a Bachelor's degree in electrical engineering or a related field with two to three years of practical experience with digital signal processing algorithms and systems; or (2) a Master's degree in electrical engineering or a related field with a specialty in digital signal processing.” SIB at 14.



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As noted by Staff, the differences between Andrea's proposed definition of the level of ordinary skill and that which was adopted in the 949 Investigation, "does not appear to have any bearing on the issues to be decided in this investigation." *Id.* Given the subject matter of the '345 patent, I find that Andrea's proposed definition of the level of ordinary skill is appropriate.

### **D. Claim Construction**

The *Markman* order construed the term "magnitude of the frequency bins" in claims 1 and 38 to mean "amplitude of the frequency bins." Order No. 34 at 48. As noted in the *Markman* order, however, the step of "detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold" may be performed using "an estimate of amplitude." *Id.* (quoting '345 patent at col. 9:42-45 (claim 1), col. 12:16-17 (claim 38)). The *Markman* order further found that the limitations "threshold detector for setting a threshold for each frequency bin using a noise estimation process" in claim 1 and "setting a threshold" in claim 38 were not subject to § 112, ¶ 6 and that no construction was necessary for either limitation. *Id.* (quoting '345 patent at col. 9:41-42 (claim 1), col. 12:13-14 (claim 38)). The limitations "subtractor for subtracting said noise elements estimated at said positions determined by said threshold detector from said audio signal to derive said audio signal substantially without said noise" in claim 13 and "subtracting said noise elements detected in said step of detecting from said audio signal to produce an audio signal representing said audible sound substantially without said audible noise" in claim 38 were found not to be indefinite. *Id.* (quoting '345 patent at col. 10:25-29 (claim 1), col. 12:20-23 (claim 38)). The term "substantially," which appears in both limitations, was construed to mean "largely, but not wholly." *Id.*

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In addition to the terms construed in the *Markman* order, the parties agreed that the term “frequency bins” in claims 1 and 38 patent means “frequency domain outputs extending between two limiting frequencies.” *Id.* at 1-2.

### V. INFRINGEMENT

Andrea asserts that the accused Apple products literally infringe claims 4-11, 13-16, 21, 23-25, 38-40, 43, and 46 of the '345 patent. Claims 4-11, 13-16, 21, and 23-25 depend from independent claim 1. Claims 39, 40, 43, and 46 depend from independent claim 38. Claims 1 and 38 have similar limitations, and the parties' contentions with respect to each limitation are addressed below.

#### A. Legal Standards

Section 337(a)(1)(B)(i) prohibits “the importation into the United States, the sale for importation, or the sale within the United States after importation by the owner, importer, or consignee, of articles that – (i) infringe a valid and enforceable United States patent or a valid and enforceable United States copyright registered under title 17.” 19 U.S.C. §1337(a)(1)(B)(i). The Commission has held that the word “infringe” in Section 337(a)(1)(B)(i) “derives its legal meaning from 35 U.S.C. § 271, the section of the Patent Act that defines patent infringement.” *Certain Electronic Devices with Image Processing Sys., Components Thereof, and Associated Software*, Inv. No. 337-TA-724, Comm'n Op. at 13-14 (Dec. 21, 2011). Under 35 U.S.C. § 271(a), direct infringement of a patent consists of making, using, offering to sell, or selling the patented invention without consent of the patent owner.

“An infringement analysis entails two steps. The first step is determining the meaning and scope of the patent claims asserted to be infringed. The second step is comparing the properly construed claims to the device accused of infringing.” *Markman v. Westview*

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*Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995) (*en banc*), *aff'd*, 517 U.S. 370 (1996) (citation omitted). Infringement must be proven by a preponderance of the evidence. *SmithKline Diagnostics, Inc. v. Helena Labs. Corp.*, 859 F.2d 878, 889 (Fed. Cir. 1988). A preponderance of the evidence standard “requires proving that infringement was more likely than not to have occurred.” *Warner-Lambert Co. v. Teva Pharm. USA, Inc.*, 418 F.3d 1326, 1341 n.15 (Fed. Cir. 2005).

A complainant must prove either literal infringement or infringement under the doctrine of equivalents. Literal infringement requires the patentee to prove that the accused device contains each and every limitation of the asserted claim(s). *Frank's Casing Crew & Rental Tools, Inc. v. Weatherford Int'l, Inc.*, 389 F.3d 1370, 1378 (Fed. Cir. 2004). “If even one limitation is missing or not met as claimed, there is no literal infringement.” *Elkay Mfg. Co. v. EBCO Mfg. Co.*, 192 F.3d 973, 980 (Fed. Cir. 1999). Literal infringement is a question of fact. *Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1332 (Fed. Cir. 2008).

**B. Accused Products**

The accused Apple products contain a “voice processor” software module capable of invoking noise suppression audio units. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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Apple Product		Asserted Claims
iPhone 7; iPhone 7 plus		4-11, 13-16, 21, 23-25, 38-40, 43, 46
Watch Series 2		4-11, 13-16, 21, 23, 24, 38-40, 43
MacBook Pro 15" (J80); MacBook Pro 13" (J79, J130)		4-11, 13-16, 21, 23-25, 38-40, 43, 46
iPhone 6s; iPhone 6s Plus; iPhone SE		4-11, 13-16, 21, 23-25, 38-40, 43, 46
iPad Pro (12.9"); iPad Pro (9.7"); iMac 27"; iMac 21.5"		4-11, 13-16, 21, 23-25, 38-40, 43, 46
iPhone 6; iPhone 6 Plus		4-11, 13-16, 21, 23-25, 38-40, 43, 46
iPad Air 2; iPad mini 4; MacBook; MacBook Pro 13" (J52)		4-11, 13-16, 21, 23-25, 38-40, 43, 46
Watch Series 1, Watch		4-11, 13-16, 21, 23-25, 38-40, 43, 46
iPad Air; iPad mini 2; MacBook Air; MacBook Pro		4-11, 13-16, 21, 23-25, 38-40, 43, 46

115" (J145)		
AirPods		4-11, 13-16, 21, 23-25, 38-40, 43, 46

Andrea's expert, Mr. DeJaco, analyzed the relevant source code for each of the accused Apple products to find evidence of infringement for each limitation of the asserted claims. CX-0007C at Q/A 9. The parties do not generally dispute Mr. DeJaco's analysis of how the products function, but Apple disputes the application of Mr. DeJaco's analysis to the claim language of the '345 patent for several critical limitations, as discussed below.

**C. Independent Claims 1 and 38**

- 1. "an input for inputting an audio signal which includes a noise signal" (claim 1)/"inputting said audio signal which includes said noise signal" (claim 38)**

There is no dispute between the parties that the accused products include an input for inputting an audio signal.<sup>13</sup> Mr. DeJaco identifies these inputs in his witness statement. CX-0007C at Q/A 68-75, 278, 303-307, 321, 342-346, 373, 401-403, 487.

- 2. "a frequency spectrum generator for generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal" (claim 1)/"generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal" (claim 38)**

Claims 1 and 38 require a means for or step of "generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal." '345 patent at col. 9:38-40 (claim 1), col. 12:11-12 (claim 38). Mr. DeJaco identifies [REDACTED] in each of the accused products, and Andrea contends that [REDACTED] generate a

<sup>13</sup> There is also no dispute regarding infringement with respect to the preambles of claim 1 and claim 38, which do not appear to be limiting.

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frequency spectrum that infringes this claim limitation. CX-0007C at Q/A 76-85, 279, 308-311, 322, 347-350, 374, 404-412, 488.

**a. Time Domain and Frequency Domain**

The parties agreed that the term “frequency bins” in claims 1 and 38 means “frequency domain outputs extending between two limiting frequencies.” Order No. 34 at 1-2. Apple argues that the Apple AirPods do not infringe this limitation because they [REDACTED] [REDACTED]. RIB at 49; RRB at 24. Apple’s only evidence regarding the AirPods is a statement from Apple engineer Vasu Iyengar that [REDACTED] [REDACTED] Tr. at 444-45. Andrea relies on Mr. DeJaco’s analysis of the AirPods source code, where he identifies [REDACTED] that generates the claimed frequency bins. CX-0007C at Q/A 404-12. Apple does not explain why Mr. DeJaco’s analysis is wrong and does not identify any particular source code or other evidence that demonstrates how [REDACTED] [REDACTED]. Mr. Iyengar’s conclusory statement, standing alone, does not adequately refute Mr. DeJaco’s expert testimony. On this record, I find that Andrea has carried its burden to show that all of the accused products, including the AirPods, include a frequency spectrum generator that generates “frequency bins” as required by the asserted claims.

**b. “said audio signal”**

Apple further argues that the “audio signal” identified by Andrea in the accused products is not the signal that is used to generate a frequency spectrum and frequency bins, as required by the claim language. RIB at 48. Apple contends that the audio signal generated by the microphones in the accused products is transformed into a different signal through various filtering operations before it is converted into a frequency spectrum. *Id.* In particular, Apple

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points to [REDACTED]

[REDACTED]. RX-0011C (Cohen RWS) at Q/A 103. Andrea argues that pre-processing of the audio signal is compatible with the claims, pointing to a passage in the specification stating: “the signal is derived from a microphone signal that has been processed through an analog front end, A/D converter and a decimation filter.” ’345 patent at col. 4:53-56. The specification describes other additional processing of the audio signal: “In another embodiment, the input is taken from the output of a beamformer or even an adaptive beamformer.” *Id.* at col. 4:56-58. Apple argues that [REDACTED], which is different from the decimation filters and beamformers described in the specification. RRB at 23-24.

Apple’s interpretation of this limitation is not supported by the claim language or specification. The claims refer to the “frequency spectrum of said audio signal,” and there is no reason to read this limitation to preclude intermediate signal processing of the audio signal. Apple presents evidence that the [REDACTED] in the accused products is different from the processing disclosed in the specification, but Apple does not explain why this distinction matters in the context of infringement. Moreover, as Staff points out, there is no dispute that the accused [REDACTED], and the accused products would infringe even under Apple’s interpretation if that input signal were identified as the claimed “audio signal.” SIB at 20. Accordingly, there is no basis for non-infringement based on the “audio signal” limitation.

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3. “a threshold detector for setting a threshold for each frequency bin . . . and for detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold” (claim 1)/“setting a threshold for each frequency bin using a noise estimation process” and “detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold” (claim 38)

Claims 1 and 38 require a means for or step of setting a threshold for each frequency bin and detecting whether the “magnitude” of a frequency bin is less than a corresponding threshold. ’345 patent at col. 9:41-47, col. 11:16-18. Andrea relies on Mr. DeJaco’s analysis of Apple’s noise suppression algorithms as evidence that the accused products infringe this limitation. CX-0007C at Q/A 86-169, 280-81, 312-315, 323-24, 351-367, 375-76, 413-439, 489-90. Apple argues that the accused products do not satisfy these limitations because the noise estimators in the accused products use power—not magnitude—to perform any threshold detection. RIB at 26-27. In addition, Apple argues that the claims’ recital of “the corresponding threshold” requires a binary determination of a single threshold to determine whether noise is present, but the [REDACTED]

[REDACTED] *Id.* at 27.

**a. Power and Magnitude**

As discussed above, the claim term “magnitude of the frequency bins” was construed to mean amplitude of the frequency bins, noting that this limitation may be satisfied by the use of an estimate of amplitude. Order No. 34 at 48. It is undisputed that all of the accused products use a measurement of power, computed by a sum-of-squares calculation, in the accused threshold detecting step. CIB at 14-17; RIB at 27. The parties also do not dispute that there is a mathematical relationship between power and amplitude, where power is amplitude squared. CIB at 14-17; RIB at 31; SIB at 17.



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Andrea contends that power is an estimate of amplitude that meets the threshold detector limitation. CIB at 14-17. Andrea cites evidence in the '345 patent specification where the term "energy" is used in the context of threshold detection:

In the present invention, a separate adaptive threshold is implemented for each frequency bin 302. This allows the location of noise elements for each bin separately without the examination of the overall signal energy. The logic behind this method is that, for each syllable, the energy may appear at different frequency bands. At the same time, other frequency bands may contain noise elements. It is therefore possible to apply a non-sensitive threshold for the noise and yet locate many non-speech data points for each bin, even within a continuous speech case. The advantage of this method is that it allows the collection of many noise segments for a good and stable estimation of the noise, even within continuous speech segments.

'345 patent, col. 6:10-22. The '345 patent also uses the term energy when describing a prior art process where "the noise magnitude spectrum is estimated by performing an FFT of 256 points of the non-speech time intervals and computing the energy of each frequency bin." *Id.* at col. 2:11-14. Andrea relies on the testimony of its expert, Mr. DeJaco, that the term "energy" is a synonym for the sum-of-squares computation of power. CX-0007C at Q/A 107. Apple disagrees with this opinion, contending that energy is a different quantity that represents power over time. RRB at 15 (citing RX-0003C (Kyriakakis WS) at Q/A 58; RX-2551C (Iyengar WS) at Q/A 87)). Although Andrea cites some evidence that the term "energy" is used to mean something similar to power, the cited passages in the '345 patent do not appear to use "energy" to refer to a specific measurable quantity, such as power. The '345 patent uses the language "computing the energy of each frequency bin" in reference to the prior art method disclosed in *Suppression of Acoustic Noise in Speech Using Spectral Subtraction* by Steven F. Boll ("Boll"), and this article uses the term "energy" to generically describe the level of a signal, rather than to refer to any specific quantity. Boll describes mathematical computations of "magnitude" that are consistent with the '345 patent but only uses "energy" in a more qualitative sense, describing

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“low energy speech” and “high energy frequency bins” without referencing magnitude, power, or any other specific quantity. JX-0122 at 0003. The use of the term “energy” in the specification of the ’345 patent is consistent with its more qualitative use in Boll, and it does not support a change in the construction of “magnitude” to include either Andrea’s or Apple’s definitions of energy.

As set forth in the *Markman* Order, the asserted claims use the term “magnitude,” which has a specific and well-established meaning that would be known to a person of ordinary skill in the art. See Order 34 at 34-40. There is no evidence that the inventors sought to re-define the term “magnitude” through their use of “energy” or any other language in the specification, and the construction set forth in the *Markman* Order remains the one “that stays true to the claim language and most naturally aligns with the patent's description of the invention.” *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998). Andrea has not identified any compelling evidence to expand the scope of this term beyond its ordinary meaning, which corresponds to the amplitude of the frequency bins.

Even without any change in claim construction, Andrea and Staff argue that this claim limitation is satisfied by comparing power to a threshold because there is a mathematical relationship between power and magnitude/amplitude: power is amplitude squared. CIB at 15-17; SIB at 17-19. On cross-examination, Apple’s expert, Dr. Cohen, admitted that power goes up when amplitude goes up, and power goes down when amplitude goes down. Tr. at 546. Moreover, simple algebra can show that if the magnitude of a frequency bin is less than a particular threshold value, then the power of that frequency bin would be less than the threshold value squared. *Id.* at 550-51. It is undisputed that power can be used to perform the same function as magnitude (detecting noise elements for each frequency bin) in substantially the

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same way (comparing the level of the signal to the threshold) to achieve the same result (setting a new threshold for noise when the level is below the threshold). RRB at 10-11. But this is the test for the doctrine of equivalents, which was precluded on summary determination based on prosecution history estoppel. Order No. 47 (July 28, 2017) at 10-15, *unreviewed by Comm'n Notice* (Aug. 29, 2017).

Andrea must prove literal infringement, which requires that “every limitation set forth in a claim must be found in an accused product, exactly.” *Southwall Techs., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1575 (Fed. Cir. 1995); *see also Kraft Foods, Inc. v. Int'l Trading Co.*, 203 F.3d 1362, 1370 (Fed. Cir. 2000) (“A claim is literally infringed when the accused device literally embodies each limitation of the claim.”). The claim language requires “detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold.” ’345 patent at col. 9:41-47, col. 11:16-18. Accordingly, literal infringement requires a literal comparison of magnitude to a threshold. The accused products cannot literally infringe this limitation without an explicit calculation or estimation of magnitude.

There is no dispute that the accused products use power, not magnitude, to make any threshold comparison. Andrea admits that the numerical values associated with power and magnitude are different. CRB at 11. Nevertheless, Andrea argues that power is an “estimate” of magnitude in the context of the ’345 patent. CIB at 14-17. This is not consistent with the specification’s examples of estimation, however, which use simplified mathematical calculations to estimate the same underlying quantity. *See* ’345 patent at col. 5:36-44 (“The straight forward approach is to estimate the magnitude. . . . In order to save processing time and complexity the signal magnitude (Y) is estimated by an estimator 204 using an approximation formula instead . . .”), 5:49-55 (describing a smoothing method that averages magnitudes of neighboring bins).

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Power is not an estimate of magnitude but a different quantity that is measured using different units; Dr. Kyriakakis explained that magnitude is measured in volts while power is measured in watts. RX-0003C at Q/A 58. Apple identifies numerous other differences between power and magnitude, particularly in the context of scaling, subtraction, and ratio operations. RIB at 30-36. Andrea argues that these distinctions between power and magnitude do not make a difference in the context of the threshold comparison claimed in the '345 patent. CRB at 11-14. This argument appears to rely on an “insubstantial differences” test that would prove infringement under the doctrine of equivalents, which was precluded by Order No. 47. *See Mylan Institutional LLC v. Aurobindo Pharma Ltd.*, 857 F.3d 858, 866-67 (Fed. Cir. 2017) (recognizing that “the Supreme Court set out two frameworks for evaluating equivalence—the familiar [function-way-result] test . . . and the insubstantial differences test (whether the accused product or process is substantially different from what is patented).” (citing *Graver Tank & Mfg. Co. v. Linde Air Prod. Co.*, 339 U.S. 605 (1950))). Power may be equivalent to magnitude in the context of the '345 patent, but Andrea cannot refute Apple’s evidence showing that power and magnitude are literally different quantities. Accordingly, none of the accused Apple products literally infringe this limitation.

### b. Binary Comparison

Apple further contends that the threshold detector limitation requires a binary comparison, and the accused products do not infringe because they perform a [REDACTED] [REDACTED] to determine the presence of noise. RIB at 39-47. Apple relies on Dr. Cohen’s analysis of the noise suppression algorithms in the accused products. RX-0011C at Q/A 62-87. For the products that use the [REDACTED], Dr. Cohen found that the algorithm could be represented as “[REDACTED]

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██████████.” *Id.* at Q/A 66; RDX-0011C.026. For the products using the ██████████  
██████████, Dr. Cohen identified ██████████  
██████████ *Id.* at Q/A 68; RDX-0011C.0030. Dr. Cohen also  
found that “██████████  
██████████.” *Id.* at Q/A 72; RDX-0011C.0033. With respect to the  
noise estimation algorithms in the AirPods, Dr. Cohen found that ██████████  
██████████  
██████████. *Id.* at Q/A 75; RDX-  
0011C.0035-.0036.<sup>14</sup>

Andrea does not dispute Apple’s interpretation of the claims requiring a binary  
comparison, but there is a dispute regarding Dr. Cohen’s analysis of the accused products. To  
show the presence of a binary comparison, Andrea relies on Mr. DeJaco’s analysis of the source  
code for the ██████████  
██████████. CIB at 23-26, 142-150, 163-169. Mr. DeJaco identifies ██████████  
██████████. CX-0007C at Q/A 117-125.  
Mr. DeJaco identifies ██████████  
██████████. *Id.* at Q/A 142-150, 163-169. Andrea concedes that Apple performs  
██████████  
██████████ CRB at 19. Andrea

<sup>14</sup> Apple also identifies a “██████████” that allegedly does not infringe this  
limitation but instead uses “██████████  
██████████.” RIB at 49. Apple does not clearly identify which accused  
products use this detector, however, and Andrea does not appear to accuse this detector of  
infringement.

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makes the same argument with respect to the [REDACTED]

[REDACTED]. *Id.* at 19-20. Staff similarly argues that the accused products infringe

[REDACTED]. SIB at 19-20; SRB at 6-7.

I agree with Andrea and Staff that there is infringement of this limitation by the [REDACTED]  
[REDACTED]. Mr. DeJaco has identified comparisons to a threshold in each of these algorithms whereby the noise estimate is updated when the comparison is below the threshold. For the [REDACTED]  
[REDACTED], however, neither Andrea nor Staff offer any rebuttal to Dr. Cohen's analysis of the source code showing that [REDACTED]  
[REDACTED]. Accordingly, Andrea has failed to show that these algorithms infringe the claim limitation requiring that the threshold detector "detect[] for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold, thereby detecting the position of noise elements for each frequency bin." Although these algorithms do not infringe this limitation, [REDACTED]  
[REDACTED], so this is not an independent basis for non-infringement for any particular product.

4. **“a subtractor for subtracting said noise elements” (claim 13)/“subtracting said noise elements detected in said step of detecting” (claim 38)**

Claim 13 is a dependent claim that requires “a subtractor for subtracting said noise elements estimated at said positions determined by said threshold detector from said audio signal to derive said audio signal substantially without said noise.” '345 patent at col. 10:25-29. Claim

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38 includes a “subtracting” step with similar limitations. *Id.* at col. 12:20-23. Andrea relies on the analysis of Apple source code by Mr. DeJaco as evidence for infringement of these limitations. CX-0007C at Q/A 214-228, 282, 317, 325, 369, 377, 462-466, 491. Andrea appears to have carried its burden, and Apple does not raise any specific non-infringement arguments with respect to this limitation. Nevertheless, the accused products do not infringe claim 13 or claim 38 because these products do not literally infringe the threshold detector limitation, as discussed above.

### **D. Dependent Claims**

In addition to claim 13, Andrea asserts infringement of dependent claims 4-11, 14-16, 21, 23-25, 39, 40, 43, and 46 of the '345 patent. CIB at 39-46. Andrea relies on Mr. DeJaco's analysis of Apple source code for evidence of infringement of these limitations. CX-0007C at Q/A 170-286, 316-329, 368-381, 440-498. Although Apple does not raise any distinct non-infringement arguments with respect to these claims, the accused products cannot infringe the additional limitations of these claims, which require using the “magnitude” of the frequency bins. Moreover, there is no infringement of any dependent claim because these products do not literally infringe the threshold detector limitations of the independent claims.

Accordingly, the accused Apple products do not infringe any of the asserted claims of the '345 patent.

## **VI. INVALIDITY**

Apple contends that the claims at issue are invalid as anticipated or obvious. RIB at 72-73. Specifically, Apple argues that claims 1, 13, 14, 21, and 38 are anticipated by U.S. Patent No. 6,035,048, entitled “Method and Apparatus for Reducing Noise in Speech and Audio Signals,” to E. Diethorn (“Diethorn”) (RX-0047) and that claims 1, 13, 21, and 38 are anticipated

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by the paper “Noise Estimation Techniques for Robust Speech Recognition” by H.G. Hirsch *et al.* (“Hirsch”) (RX-0064). Apple further argues that if power is found to be an estimate of amplitude, as argued by Andrea, U.S. Patent No. 5,550,924, entitled “Reduction of Background Noise for Speech Enhancement,” to Helf *et al.* (“Helf”) (RX-0040) anticipates claims 1, 4-7, 9-11, and 21. Apple asserts that the dependent claims at issue are rendered obvious by the anticipatory references in combination with one or more of the following secondary references:

- the article “An Efficient Algorithm to Estimate the Instantaneous SNR of Speech Signals” by R. Martin (“Martin 93”) (RX-0071);
- the article “Spectral Subtraction Based on Minimum Statistics” by R. Martin (“Martin 94”) (RX-0070);
- the paper “Suppression of Acoustic Noise in Speech Using Spectral Subtraction” by S. Boll (“Boll”) (RX-0056);
- U.S. Patent 5,706,395, entitled “Adaptive Wiener Filtering Using a Dynamic Suppression Factor,” to Arslan *et al.* (“Arslan”) (RX-0043);
- the paper “Magnitude Approximations for Microprocessor Implementation” by W. Adams *et al.* (“Adams”) (RX-0053); and
- U.S. Patent No. 5,459,683, entitled “Apparatus for Calculating the Square Root of the Sum of Two Squares,” to M. Uesugi *et al.* (“Uesugi”) (RX-0038).

For the reasons discussed below, I find that none of the claims at issue are anticipated by or obvious in view of the prior art cited by Apple.

### A. Legal Standards

It is the respondent’s burden to prove invalidity, and the burden of proof never shifts to the patentee to prove validity. *Scanner Techs. Corp. v. ICOS Vision Sys. Corp. N.V.*, 528 F.3d



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1365, 1380 (Fed. Cir. 2008). “Under the patent statutes, a patent enjoys a presumption of validity, *see* 35 U.S.C. § 282, which can be overcome only through facts supported by clear and convincing evidence. . . .” *SRAM Corp. v. AD-II Eng’g, Inc.*, 465 F.3d 1351, 1357 (Fed. Cir. 2006); *see also Microsoft Corp. v. i4i Ltd. P’ship*, 131 S. Ct. 2238, 2242-2253 (2011) (upholding the “clear and convincing” standard for invalidity).

The clear and convincing evidence standard placed on the party asserting an invalidity defense requires a level of proof beyond the preponderance of the evidence. Although not susceptible to precise definition, “clear and convincing” evidence has been described as evidence that produces in the mind of the trier of fact “an abiding conviction that the truth of a factual contention is ‘highly probable.’” *Price v. Symsek*, 988 F.2d 1187, 1191 (Fed. Cir. 1993) (quoting *Buildex, Inc. v. Kason Indus., Inc.*, 849 F.2d 1461, 1463 (Fed. Cir. 1988)).

### 1. Anticipation

Pursuant to 35 U.S.C. § 102,<sup>15</sup> a patent claim is invalid as anticipated if:

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant;
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States;
- (c) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent;
- (g)(2) before such person’s invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it.

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<sup>15</sup> As explained in the revision notes and legislative reports in 35 U.S.C.A. § 100 (May 13, 2015), the language of 35 U.S.C. § 102 that was effective prior to the America Invents Act controls in this Investigation.

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35 U.S.C. § 102 (2008). “A patent is invalid for anticipation if a single prior art reference discloses each and every limitation of the claimed invention. Moreover, a prior art reference may anticipate without disclosing a feature of the claimed invention if that missing characteristic is necessarily present, or inherent, in the single anticipating reference.” *Schering Corp. v. Geneva Pharm., Inc.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003) (citations omitted).

### 2. Obviousness

Even if a patent is not invalid as 35 U.S.C. § 102, it may still be invalid as obvious under 35 U.S.C. § 103 if the differences between the claimed subject matter “and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art.” 35 U.S.C. § 103(a) (2008).<sup>16</sup> “Obviousness is a question of law based on underlying questions of fact.” *Scanner Techs.*, 528 F.3d at 1379. The underlying factual determinations include: “(1) the scope and content of the prior art, (2) the level of ordinary skill in the art, (3) the differences between the claimed invention and the prior art, and (4) objective indicia of non-obviousness.” *Id.* (citing *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966)). These factual determinations are often referred to as the “*Graham* factors.”

The critical inquiry in determining the differences between the claimed invention and the prior art is whether there is a reason to combine the prior art references. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418-21 (2007). In *KSR*, the Supreme Court rejected the Federal Circuit’s rigid application of the teaching-suggestion-motivation test. While the Court stated that “it can be important to identify a reason that would have prompted a person of ordinary skill in the

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<sup>16</sup> See *supra*, n. 15.

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relevant field to combine the elements in the way the claimed new invention does,” it described a more flexible analysis. Under *KSR*, determining whether there was an apparent reason to combine references, a court can “look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art.” *Id.* at 418. However, “the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.* Since *KSR*, the Federal Circuit has announced that, where a patent challenger contends that a patent is invalid for obviousness based on a combination of prior art references, “the burden falls on the patent challenger to show by clear and convincing evidence that a person of ordinary skill in the art would have had reason to attempt to make the composition or device . . . and would have had a reasonable expectation of success in doing so.” *PharmaStem Therapeutics, Inc. v. ViaCell, Inc.*, 491 F.3d 1342, 1360 (Fed. Cir. 2007).

In addition to demonstrating that a reason exists to combine prior art references, the challenger must demonstrate that the combination of prior art references discloses all of the limitations of the claims. *Hearing Components, Inc. v. Shure Inc.*, 600 F.3d 1357, 1373-1374 (Fed. Cir. 2010) (*abrogated on other grounds by Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S.Ct. 2120 (2014)) (upholding finding of non-obviousness based on the fact that there was substantial evidence that the asserted combination of references failed to disclose a claim limitation); *Velandar v. Garner*, 348 F.3d 1359, 1363 (Fed. Cir. 2003) (explaining that a requirement for a finding of obviousness is that “all the elements of an invention are found in a combination of prior art references”).

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### **B. Priority Date**

The '345 patent issued on March 26, 2002 from an application filed on February 18, 1999. JX-0001. Accordingly, the '345 patent is entitled to a priority date of February 18, 1999.

### **C. Prior Art Status of References**

Andrea does not dispute that the references relied upon by Apple are prior art under 35 U.S.C. § 102. *Compare* RIB at 73 (noting that there is no dispute that the references are prior art) *with* CRB at 33-47 (not disputing Apple's representation).

Diethorn issued on March 7, 2000, based on an application filed on June 18, 1997 and is prior art under 35 U.S.C. § 102(e). RX-0047 at 0001. Hirsch was published in the Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing in 1995 and is prior art under 35 U.S.C. § 102(a) and (b). RX-0064 at 0001. Martin 93 was published in 1993 by the International Speech Communications Association as part of the Proceedings of Eurospeech and is prior art under 35 U.S.C. § 102(a) and (b). RX-0071 at 0001. Martin 94 was published in Signal Processing VII: Theories and Applications in 1994 and is prior art under 35 U.S.C. § 102(a) and (b). RX-0070 at 0001.

Helf issued on August 27, 1996 based on an application filed on March 13, 1995 and is prior art under 35 U.S.C. § 102(a), (b), and (e). RX-0040 at 0001. Boll was published in the IEEE Transactions on Acoustics, Speech, and Signal Processing in 1979 and is prior art under 35 U.S.C. § 102(a) and (b). RX-0056 at 0001. Arslan issued on January 6, 1998 based on an application filed on April 19, 1995 and is prior art under 35 U.S.C. § 102(a), (b), and (e). RX-0043 at 0001. Adams was published in October, 1983 by the IEEE and is prior art under 35 U.S.C. § 102(a) and (b). RX-0053 at 0001. Uesugi issued on October 17, 1995 based on an

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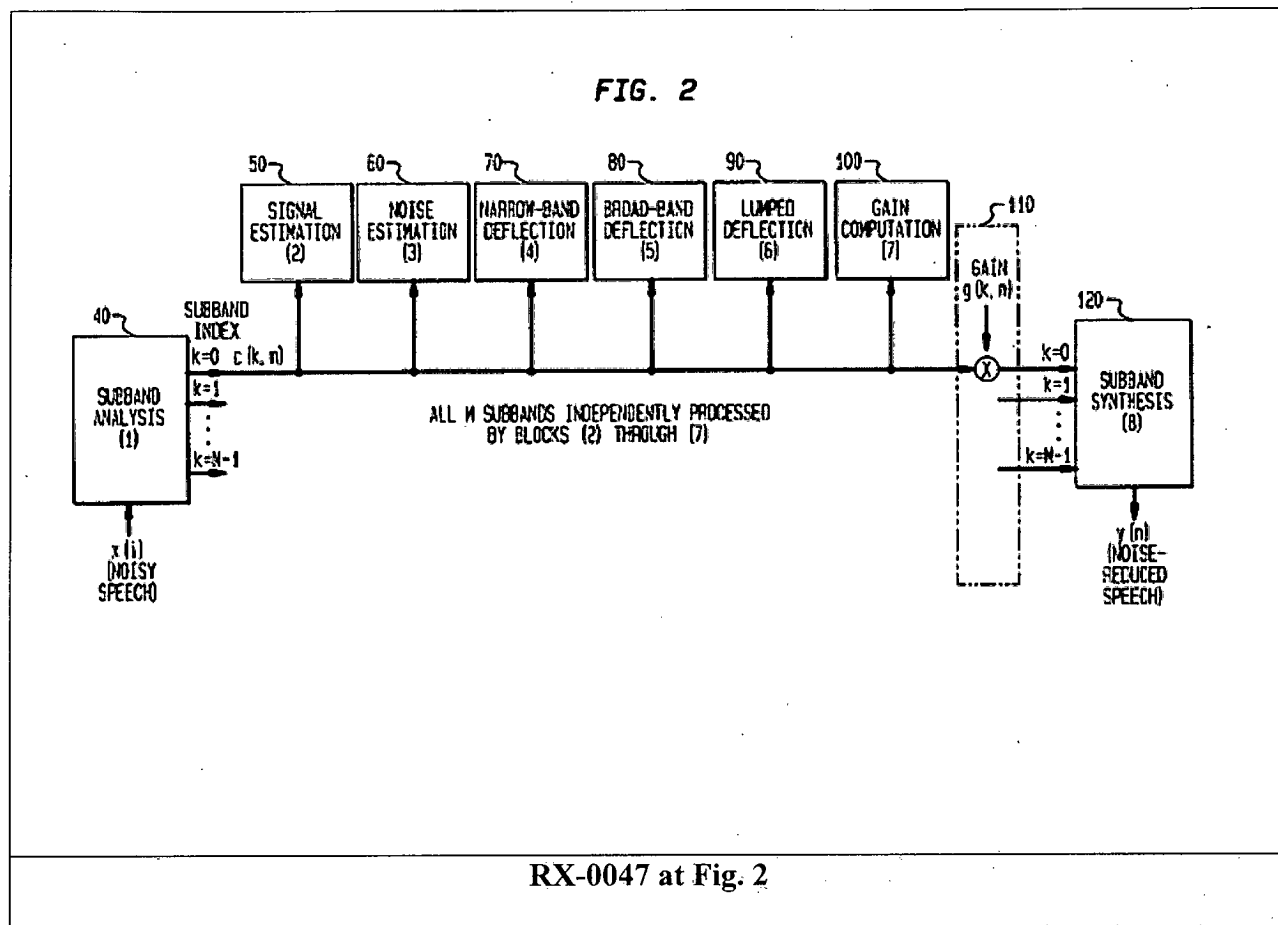
application filed on July 20, 1994 and is prior art under 35 U.S.C. § 102(a), (b), and (e). RX-0038 at 0001.

**D. Anticipation**

Apple argues that claims 1, 13, 14, and 38 are anticipated by Diethorn and that claims 1, 13, 21, and 38 are anticipated by Hirsch. Apple further argues that under Andrea's interpretation of the "magnitude" limitations, Helf anticipates claims 1, 4-7, 9-11, 21, 38-40, and 43. For the reasons set forth below, I find that the references do not anticipate any claim.

**1. Diethorn does not anticipate claims 1, 13, 14, and 38 of the '345 patent.**

The purported invention disclosed in Diethorn "relates to the use of digital filtering techniques to improve the audibility or intelligibility of speech or other audio-frequency signals that are corrupted with noise." RX-0047 at col. 1:6-9. Figure 2 shows the "signal flow through various processing stages" of an exemplary embodiment. *Id.* at col. 4:1-3.



In Figure 2, audio signal ( $x(i)$ ) is converted into a plurality of sub-bands ( $c(k, m)$ ) by Subband Analysis block 40. *Id.* at col. 4:30-36. Signal Estimation block 50 generates a signal estimate ( $s(k, m)$ ) for each sub-band. *Id.* at col. 4:32-33. If speech is present, the signal estimate represents the signal level corresponding to the speech. *Id.* at col. 4:33-36. Noise Estimation block 60 calculates a noise estimate ( $n(k, m)$ ) for each sub-band. *Id.* at col. 4:37-38. The noise estimate represents the stationary component of the corrupted signal, which is assumed to correspond to the background noise. *Id.* at col. 4:38-41.

Narrow-Band Deflection block 70 and the Broad-Band Deflection block 80 calculate a narrowband deflection ( $d(k, m)$ ) and a broadband deflection ( $D(k, m)$ ), respectively, for each sub-band. *Id.* at col. 4:42-55. Both the narrowband and broadband deflections are derived from

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the signal estimate and the noise estimate. *Id.* at col. 4:45-46. The narrowband deflection is the signal-to-noise ratio for a given sub-band, whereas the broadband deflection is an average of the narrowband deflections of a range of sub-bands centered around a given sub-band. *Id.* at col. 7:8-17. Lumped Deflection block 90 calculates a lumped deflection (PH (k, m)) from the narrowband and broadband deflections. *Id.* at col. 4:56-57. The lumped deflection indicates the presence of speech when speech is indicated by either by the narrowband or broadband deflection. *Id.* at col. 4:57-60.

Gain Computation block 100 calculates a sub-band gain (g (k, m)) for each sub-band. *Id.* at col. 4:63-64. Typically, if speech is likely present in a sub-band, a sub-band gain of 1 will be applied; if speech is not likely to be present, a sub-band gain of less than 1 will be applied. *Id.* at col. 4:64-67. At block 110, each sub-band time series is modified with its respective sub-band gain (g (k, m)). *Id.* at col. 5:6-7. At block 120, the modified sub-bands are recombined into full-band signal. *Id.* at col. 5:8-10.

Andrea and Staff argue that Diethorn does not anticipate claims 13 and 38 because it does not disclose a system that has a means for or performs the step of subtracting the detected noise elements from the audio signal so as to generate a signal that is “substantially” without noise. RX-0001 at col. 10:25-29 (claim 13), col. 12:20-23 (claim 38). In support of their argument, Andrea and Staff rely on the testimony of Andrea’s expert Dr. Douglas, who testifies that because the “system of Diethorn does not guarantee that the gain value is less than 1 when noise values are detected, . . . Diethorn does not teach a system that includes a subtractor that subtracts said noise elements.” CX-1888C (Douglas RWS) at Q/A 289, 325. Although Dr. Douglas does not elaborate on this testimony, it appears to be based on the premise that the gain value for a sub-band can be set to 1 and, if so set, noise will not be removed from the sub-band. RX-0047 at

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col. 4:64-67. The claims, however, do not require that all noise be removed through the subtraction process, only that the resulting audio signal be “substantially” noise free. RX-0001 at col. 10:25-29 (claim 13), col. 12:20-23 (claim 38). Although Dr. Douglas is correct that the gain value can be set to 1, it is only set at 1 if it is determined that speech is likely present in the sub-band. *Id.* at col.4:63-67. Otherwise the gain value is set to less than 1 and noise is removed from the sub-band. *Id.* Doing so allows Diethorn to satisfy the claim language requiring the generation of a substantially noise free audio signal. RX-0047 at col. 1:6-9 (“This invention relates to the use of digital filtering techniques to improve the audibility or intelligibility of speech or other audio-frequency signals that are corrupted with noise.”), col. 3:49-52 (“I believe that through the use of my invention, noise in the speech channels of various kinds of telecommunication equipment can be efficiently reduced, and improved subjective audio quality can thereby be efficiently achieved.”).

Staff also argues that Diethorn is not an anticipatory reference because it does not disclose “frequency bins” as required by the claims. Diethorn teaches that the audio signal being processed is first converted into a plurality of “sub-band[s].” *Id.* at col. 4:30-33. Diethorn explicitly refers to the sub-bands as frequency bins:

Each *frequency bin* output from the DFT represents one new complex time-series sample for the sub-band frequency range corresponding to that *bin*. The bandwidth of each *bin*, or sub-band time series, is given by the ratio of sampling frequency to transform length.

*Id.* at col. 6:1-6 (emphasis added). The “frequency bins” of Diethorn, however, are not the claimed “frequency bins.” As discussed above, the parties agreed to a construction for the claimed frequency bins that requires them to be frequency domain outputs. In contrast, the sub-bands disclosed in Diethorn are the same as the frequency-limited time domain signals disclosed in ’637 patent.



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Specifically, Diethorn teaches that the “preferred sub-band analysis technique is based on a perfect reconstruction filter bank using the discrete Fourier transform (DFT) filter bank method.” RX-0047 at col. 5:20-22. Diethorn notes that the DFT (Discrete Filter Bank) filter bank method is “described in detail in R. E. Crochiere and L. R. Rabiner, *Multirate Digital Signal Processing*, Prentice-Hall, Englewood Cliffs, N.J. . . . at Chapter 7, ‘Multirate Techniques in Filter Banks and Spectrum Analyzers and Synthesizers,’ pages 289-400.” RX-0047 at col. 1:53-61, col. 5:22-25. Similarly, the ’637 patent teaches that the frequency-limited time domain signals can be generated using a “generalized DFT filter bank using single side band modulation . . . as described, for example, in ‘*Multirate Digital Signal Processing*,’ Ronald E. Crochiere, Prentice Hall Signal Processing Series.” RX-0051 at col. 4:66-col. 5:7. As argued by Apple and discussed in more detail below in the context of domestic industry, the outputs of the DFT filter bank disclosed in the ’637 patent are in the time domain, not the frequency domain:

The ’637 specification explicitly states that the outputs of the DFT-SSB filter bank algorithm are *time domain* sub-bands:

[I]t is preferred that the generalized DFT filter bank using single side band modulation be employed . . . . In essence, the band splitting processes, for example, 8 input points at a time resulting in 16 output points each representing 1 time domain sample per frequency band.

RIB at 59 (quoting RX-0051 at col. 4:66-col. 5:12) (emphasis in original); *see also* RIB at 10-11 (arguing that the outputs of a DFT filter bank are in the time domain, not the frequency domain). Accordingly, the sub-bands disclosed in Diethorn are not the claimed frequency bins for the same reasons that the frequency-limited time-domain signal sub-bands of the ’637 patent are not.

**2. Hirsch does not anticipate claims 1, 13, 21, and 38.**

Hirsch discloses a method for “estimating the noise spectra or the noise characteristics for noisy speech signals.” RX-0064 at 0001.<sup>17</sup> In the disclosed method, an incoming audio signal is split into sub-bands, and an “adaptive threshold” is set for each sub-band. *Id.* In order to set the adaptive thresholds, noise estimate ( $\hat{N}_i$ ) is calculated for each sub-band. *Id.* A sub-band’s noise estimate ( $\hat{N}_i$ ) is a weighted sum of the sub-band’s past magnitude values. *Id.* A sub-band’s adaptive threshold is obtained by multiplying the noise estimate ( $\hat{N}_i$ ) by an overestimation factor ( $\beta$ ):  $\beta\hat{N}_i$ . *Id.* Each sub-band’s current magnitude ( $X_i$ ) is compared to the corresponding adaptive threshold:  $X_i - \beta\hat{N}_i$ . *Id.* If the comparison yields a positive value, the sub-band is deemed to contain speech. Conversely, if the comparison yields a negative value, the sub-band is deemed to contain noise. *Id.* When a sub-band containing speech is encountered, the system stops estimating noise ( $\hat{N}_i$ ) for that sub-band:

When the actual spectral component  $X_i(k)$  exceeds this threshold this is considered as a rough detection of speech and the recursive accumulation [of  $\hat{N}_i$ ] is stopped. The accumulated value is taken as an estimation for the noise level at this time.

*Id.* at 0001.

Andrea and Staff argue that because the adaptive threshold is not updated after the onset of speech, “Hirsch fails to disclose the ‘threshold detector’ of claim 1, since the noise estimate is never updated based on the detection of the position of noise elements in a frequency bin, and instead a predetermined threshold is used.” CIB at 80; *see also* SIB at 29. Claim 1, however, only requires that the threshold detector detect the position of noise elements for each frequency

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<sup>17</sup> Although Hirsh discloses two methods for estimating noise in a signal, Apple is only relying on the one described herein.

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bin by (1) setting a threshold for each frequency bin using a noise estimation process and (2) detecting whether the magnitude of the frequency bin is less than the corresponding threshold. '345 patent at col. 9:41-46. It does not require that the threshold detector update the thresholds for the frequency bins after speech is detected. The technique disclosed in Hirsch satisfies the “threshold detector” limitation of claim 1 because it detects the position of noise elements in each sub-band by setting a threshold for each sub-band using a noise estimation process and determining whether the sub-band’s magnitude is less than the threshold.<sup>18</sup>

Staff raises an additional argument with regard to Hirsch. Although Hirsch teaches that the incoming audio signal is split into sub-bands, it does not describe the sub-bands as being in the frequency domain. As Staff notes, “[i]t is possible that Hirsch contemplated using a filter bank, such as that described by Crochiere, that would not satisfy the ‘frequency spectrum generator’ or ‘frequency bins’ limitations of the claims.” SIB at 29. As discussed above in the context of the '637 patent and Diethorn, the DFT filter bank taught in Crochiere yields frequency-limited sub-bands that are in the time domain, not the frequency domain. Such sub-bands are not frequency bins because they are not “frequency domain outputs.” Order No. 34 at 1-2.

The only evidence identified by Apple or its expert that the sub-bands disclosed in Hirsch correspond to the claimed frequency bins is a reference in Hirsch to “FFT based spectral analysis.” RX-0003 (Kyriakakis DWS) at Q/A 359. Although Hirsch teaches that “[a]verage spectral components are calculated as [a] sum over all frames of a[n] FFT based spectral

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<sup>18</sup> Relying on the testimony of its expert, Apple argues that Hirsch’s noise estimation process will restart after the onset of speech “[w]hen the bin magnitude falls back below the adaptive threshold.” RX-0003C (Kyriakakis DWS) at Q/A 352. This testimony, however, is entitled to no weight because it is conclusory and is unsupported by the disclosure of Hirsch.

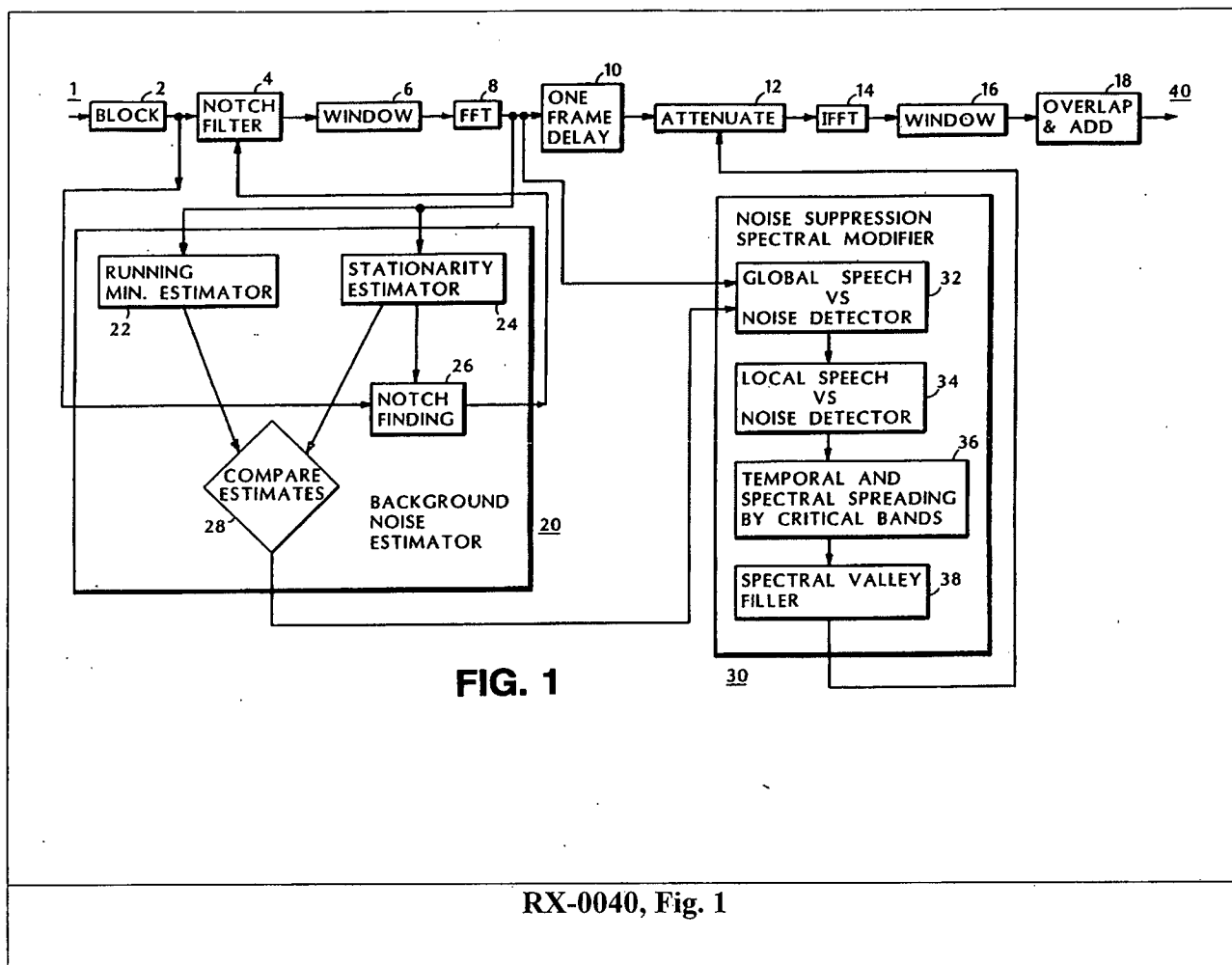
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analysis,” there is no evidence that one of ordinary skill in the art at the relevant time would have interpreted this statement to mean that the sub-bands are in the frequency domain. RX-0064 at 0002. The reference to “FFT based spectral analysis” encompasses DFT filter banks, which output sub-bands in the time domain, not the frequency domain. As explained in Apple’s post-hearing brief, a DFT filter bank uses an FFT to generate time domain sub-bands. RIB at 10-11 (“Even though an FFT is performed in the middle of this process, the process does not create frequency bins; the additional processing results in outputting sub-bands that are time domain signals.”).

Neither Apple nor Dr. Kyriakakis address why one of ordinary skill in the art would have interpreted Hirsh’s disclosure of “FFT based spectral analysis” as a reference to something other than a DFT filter bank. Crochiere, the reference cited by both Diethorn and the ’637 patent as disclosing DFT filter banks, was published in 1983—twelve years before the publication date of Hirsch. RX-0059 at 0004. Diethorn, which was filed only two years after the publication of Hirsch, reports that “using the discrete Fourier transform (DFT) filter bank method” was already “well known in the art.” RX-0047 at col. 5:20-24. Accordingly, as of the publication date of Hirsch, it is likely that a person skilled in the art would have been aware that sub-bands can be generated using DFT filter banks. Accordingly, I find that Apple has failed to meet its burden of establishing that Hirsch discloses the claimed frequency bins.

### **3. Helf does not anticipate claims 1, 4-7, 9-11, 21, 38-40, and 43.**

The invention disclosed in Helf “relates to a device for reducing the background noise of an input audio signal.” RX-0040 at col. 1:39-40. In the device disclosed in Helf, input signal 1 is split into 20 millisecond frames by framer 2.



Each frame is combined with the last 12 milliseconds of the preceding frame to generate windowed frames having durations of 32 milliseconds. RX-0040 at col. 4:3-6. After being multiplied by multiplier 6, the windowed frames are converted into the frequency domain by FFT 8. *Id.* at col 4:12-14. In order to suppress noise in the signal, attenuator 12 modifies the magnitude of the spectral components of the frequency domain components of the windowed frame using the final frequency component gain function generated by noise suppression spectral modifier 30. *Id.* at col. 4:38-41.

Noise suppression spectral modifier 30 generates the final frequency gain function from estimate of background noise obtained from background noise estimator 20. *Id.* at col 4:18-22.

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Using the background noise estimate, Global Speech Versus Noise Detector 32 classifies each frequency bin with a confidence level that reflects the probability that a particular frequency component is primarily noise or primarily an audio signal. *Id.* at col. 4:22-30. Based on these confidence levels, the gain for each frequency band is determined by Local Speech Versus Noise Detector 34. *Id.* at col. 4:30-31.

After the final frequency component gain function is applied to the frequency components of the windowed frame by attenuator 12, the frequency components are converted to the time domain by IFFT 14. *Id.* at col. 4:42-44. The resulting frame of noise-reduced signal is multiplied by window at multiplier 16. *Id.* at col. 4:44-45. The multiplied frame is overlapped and added to the previous frame by adder 18 to derive 20 milliseconds of output signal. *Id.* at col. 4:45-49.

It is undisputed that the device disclosed in *Helf* examines the frequency bins' power, not their magnitude, to determine whether the frequency bins contain noise or speech. RIB at 8 (“*Helf* operates on signal power, not magnitude, which is a different attribute.”). As discussed above with respect to the accused products, examining power does not satisfy the magnitude limitations of claims 1 and 38. *See, supra.* Accordingly, *Helf* does not satisfy the “magnitude” limitations of claims 1 and 38. RIB at 74 (“*Helf* also anticipates claims 4-7, 9-11, 13-14, 21, 38-40, and 43 if *Andrea*'s contentions, *e.g.*, that power is an estimate of amplitude, are accepted. . . . As explained above, however, the use of power does not fall within the scope of the claims because power is neither amplitude nor an estimate of amplitude.”).

Apple argues that “[a] person of ordinary skill in the art would have understood that *Helf*'s operations could be performed either on signal magnitude or signal power without any change in the underlying functions” and “would have understood how to adapt *Helf*'s equations

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based on the power of a frequency bin to instead calculate the bin’s magnitude using signal magnitude . . . without undue experimentation.” RIB at 82 (citations omitted). This, however, is an obviousness argument, not an anticipation argument. Moreover, it fails as an obviousness argument because Apple does not identify a reason as to why one of ordinary skill in the art would have so modified Helf.

**E. Obviousness**

Apple also contends that the dependent claims at issue are obvious in view of Diethorn, Hirsch, or Helf in combination with one or more secondary references. Apple divides the asserted claims into various categories and subcategories. The chart below identifies the claims in each category and subcategory and the corresponding prior art combinations.

<b>Category</b>	<b>Subcategory</b>	<b>Claim(s)</b>	<b>Prior Art Combinations</b>
<b>Minimum Tracking Claims</b>		4-7, 9-11	(1) Diethorn or (2) Hirsch in combination with <ul style="list-style-type: none"> <li>• Martin 93 or</li> <li>• Martin 94</li> </ul>
		8	(1) Diethorn,(2) Hirsch, or (3) Helf in combination with <ul style="list-style-type: none"> <li>• Martin 93 or</li> <li>• Martin 94</li> </ul>
<b>Spectral Subtraction Features</b>	Subtraction	13	(1) Diethorn or (2) Hirsch in combination with <ul style="list-style-type: none"> <li>• Boll or</li> <li>• Arslan</li> </ul>
	Filter Multiplication	14	(1) Diethorn or (2) Hirsch in combination with <ul style="list-style-type: none"> <li>• Boll or</li> <li>• Arslan</li> </ul>
	Wiener Filter	15, 16	(1) Diethorn or (2) Hirsch in combination with <ul style="list-style-type: none"> <li>• Boll</li> <li>• Arslan or</li> </ul>
	Residual Noise Reduction	17	(1) Diethorn or (2) Hirsch in combination with Boll
	Magnitude Estimation	21	(1) Diethorn or (2) Hirsh in combination with <ul style="list-style-type: none"> <li>• Adams</li> <li>• Uesugi</li> </ul>

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	Smoothing	23	(1) Diethorn in combination with <ul style="list-style-type: none"> <li>• Adams or</li> <li>• Uesugi</li> </ul> (2) Hirsch alone or in combination with <ul style="list-style-type: none"> <li>• Adams or</li> <li>• Uesugi</li> </ul>
		24	(1) Hirsh alone and in combination with <ul style="list-style-type: none"> <li>• Diethorn,</li> <li>• Boll in view of Martin 93, or</li> <li>• Arslan either alone or in view of Martin 93</li> </ul> (2) Hirsh in combination with Adams or Uesugi and in further combination with <ul style="list-style-type: none"> <li>• Diethorn,</li> <li>• Boll in view of Martin 93, or</li> <li>• Arslan either alone or in view of Martin 93</li> </ul>
	Microphone Array	25	(1) Diethorn or (2) Hirsch in combination with <ul style="list-style-type: none"> <li>• Martin 93 or</li> <li>• Martin 94</li> </ul>
<b>Method claims</b>		39	(1) Diethorn or (2) Hirsch in combination with <ul style="list-style-type: none"> <li>• Martin 93 or</li> <li>• Martin 94</li> </ul>
		40	(1) Diethorn or (2) Hirsch in combination with <ul style="list-style-type: none"> <li>• Martin 93 or</li> <li>• Martin 94</li> </ul>
		43	(1) Diethorn or (2) Hirsch in combination with <ul style="list-style-type: none"> <li>• Martin 93 or</li> <li>• Martin 94</li> </ul>
		46	(1) Diethorn or (2) Hirsch in combination with Martin 93
		47	(1) Diethorn or (2) Hirsch in combination with Boll

For each obviousness combination, Apple relies on Diethorn, Hirsch, or Helf as the primary reference to provide the limitations of independent claims 1 and 38. The other references are secondary references that Apple relies upon to provide the additional limitations required by the dependent claims. As discussed above, the primary references fail to disclose one or more limitations of the independent claims. Apple does not argue that the secondary references provide the limitations of the independent claims that were missing from the primary references.



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Accordingly, the proposed obviousness combinations fail to disclose all of the limitations of the asserted dependent claims.

### VII. UNENFORCEABILITY

#### A. Inequitable Conduct

Apple argues that the '345 patent has been rendered unenforceable because the named inventors Joseph Marash and Baruch Berdugo deceived the U.S. Patent and Trademark Office ("PTO") into allowing the claims of the '345 patent by withholding Hirsch, Martin 93, and Martin 94. RIB at 113-14.

##### 1. Legal Standards

"Inequitable conduct is an equitable defense to patent infringement that . . . bars enforcement of a patent." *Therasense, Inc. v. Becton, Dickinson and Co.*, 649 F.3d 1276, 1285 (Fed. Cir. 2011). Importantly, "[u]nlike validity defenses, which are claim specific, inequitable conduct regarding any single claim renders the entire patent unenforceable." *Id.* at 1288 (citation omitted). Accordingly, inequitable conduct relating to an unasserted claim renders an asserted claim unenforceable. *Id.* Inequitable conduct arises when "the applicant misrepresent[s] or omit[s] material information with the specific intent to deceive the PTO." *Id.* at 1287. "Intent and materiality are separate requirements," and should be analyzed independently of each other. *Id.* at 1290. Both elements must be shown by clear and convincing evidence. *Id.* at 1287.

The "specific intent to deceive" requirement is not satisfied by a "misrepresentation or omission [that] amounts to gross negligence or negligence under a 'should have known' standard." *Id.* at 1290 (*Kingsdown Med. Consultants, Ltd. v. Hollister Inc.*, 863 F.2d 867, 876 (Fed. Cir. 1988)). Instead, it must be shown that "the patentee acted knowingly and deliberately with the purpose of defrauding the PTO." *Id.* "In a case involving nondisclosure of information,

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clear and convincing evidence must show that the applicant made a deliberate decision to withhold a known material reference.” *Id.* (quoting *Molins PLC v. Textron, Inc.*, 48 F.3d 1172, 1181 (Fed. Cir. 1995) (quotation marks omitted). Because direct evidence of deceptive intent is rare, circumstantial evidence can be relied upon to show intent. *Id.* An accused infringer relying upon circumstantial evidence to show deceptive intent must show that “the specific intent to deceive . . . [is] ‘the single most reasonable inference able to be drawn from the evidence.’ ” *Id.* (quoting *Star Scientific Inc. v. R.J. Reynolds Tobacco Co.*, 537 F.3d 1357, 1366 (Fed. Cir. 2008)). The evidence “must be sufficient to **require** a finding of deceitful intent in the light of all the circumstances.” *Id.* (quoting *Kingsdown*, 863 F.2d at 873) (emphasis added by the *Thermasense* court). Therefore, if “multiple reasonable inferences . . . may be drawn, intent to deceive cannot be found.” *Id.* at 1290-91.

A misrepresentation or omission is material if the PTO would have not have allowed a claim “but for” the misrepresentation or omission. *Id.* at 1291. A withheld reference is but-for material if the PTO would not have allowed a claim had it been aware of the undisclosed prior art. Hence, in assessing the materiality of a withheld reference, the court must place itself in the shoes of the PTO. *Id.* at 1291-92. As such, the court “should apply the preponderance of the evidence standard and give claims their broadest reasonable construction.” *Id.* Therefore, even if it is found that a claim is not rendered invalid by a withheld reference, the reference may still be material because it would have blocked the claim under the PTO’s claim construction and evidentiary standards. *Id.* at 1292.

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### 2. Discussion

#### a. Hirsch is not material.

As a threshold matter, in order to prove inequitable conduct, Apple must show that prior art references allegedly withheld by Mr. Marash and Dr. Berdugo are material. *Regeneron Pharm., Inc. v. Merus N.V.*, 864 F.3d 1343, 1351 (Fed. Cir. 2017) (“The first step in an inequitable conduct inquiry is determining whether the patentee failed to disclose but-for material information to the PTO.”). The materiality of the Martin references hinges upon the materiality of Hirsch. Apple contends that the Martin references in combination with Hirsch render certain dependent claims of the ’345 patent obvious. RRB at 56. As discussed above, in these combinations Apple relies on Hirsch to supply the limitations of independent claims 1 and 38 and relies on the Martin references to supply the additional limitations of the dependent claims.

As discussed above, Apple asserts that Hirsch anticipates independent claims 1 and 38. I find that Hirsch did not anticipate independent claims 1 and 38 because Apple has not shown by clear and convincing evidence that Hirsch discloses the claimed “frequency bins.” *See supra*. Although Apple failed to show by clear and convincing evidence that Hirsch anticipates independent claims 1 and 38, this finding is not dispositive of the question of materiality. *Therasense*, 649 F.3d at 1292. In the anticipation analysis, the parties’ agreed-upon construction for the term “frequency bin” was applied and Apple was required to show that Hirsch anticipated the asserted claims by clear and convincing evidence. Determining whether the PTO would have allowed the claims in view of Hirsch, requires applying the PTO’s claim construction standard (broadest reasonable construction) and the PTO’s standard for finding claims unpatentable (preponderance of the evidence). *Therasense*, 649 F.3d at 1292.

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The first issue that must be resolved is whether the construction of “frequency bin” applied in the anticipation analysis is different than the construction that the PTO would have applied during prosecution. *Regeneron*, 864 F.3d at 1351 (“As with an invalidity analysis, the first step in determining but-for materiality of a reference is determining the scope of the claims at issue. Thus, the court must first determine the broadest reasonable construction of the claims that the PTO would have applied during prosecution.”). In finding that Hirsch did not disclose the claimed “frequency bins,” I applied the term’s agreed-upon construction: “frequency domain outputs extending between two limiting frequencies.” Order No. 34 at 1-2. None of the parties argue that the PTO would have applied a different construction. Accordingly, I will apply the agreed-upon construction in order to determine whether Hirsch is material.

The next step is to determine whether Hirsch discloses the claimed “frequency bins” under the PTO’s preponderance of the evidence standard. *Regeneron*, 864 F.3d at 1351. I find that even under the PTO’s preponderance of the evidence standard, a reasonable examiner would have allowed the claims of the ’345 patent over Hirsch. As discussed above, Hirsch teaches that the incoming signal is decomposed into sub-bands, but does not indicate whether the sub-bands are in the frequency domain. Neither Apple nor its expert have pointed to any evidence showing that one of ordinary skill in the art would have interpreted Hirsch’s disclosure of sub-bands as anything other than time-domain sub-bands generated by a DFT filter bank. The complete absence of such evidence makes it impossible to conclude that the sub-bands disclosed in Hirsch are more likely than not in the frequency domain.

In support of its argument that Hirsch is material, Apple points to the Patent Trial and Appeal Board’s (“PTAB”) decision to institute *inter partes* review (“IPR”) of the ’345 patent. The PTAB found that Apple “has established a sufficient basis to institute trial on the issue of

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whether claims 1-3, 12, 13, 21, 23, and 38 are anticipated by Hirsch.” JX-0144 at 0006. The PTAB also found that Apple’s petition had established a sufficient basis to institute trial on whether Hirsch in combination with other references, including Martin 93, rendered claims 4-11, 13-25, and 39-46 obvious. *Id.* at 0011-12. In deciding to institute the IPR, the PTAB necessarily found “that there is a reasonable likelihood” that Apple will prevail with respect to at least one of the claims under review. 35 U.S.C. § 314(a). Apple argues that this finding supports its contention that Hirsch is material. RIB at 116.

The PTAB’s finding that there was a reasonable likelihood that Apple will prevail on at least one claim, however, is not a finding that Apple has demonstrated materiality by a preponderance of the evidence. Initiation of IPR proceedings is no guarantee that the PTAB will find a patent invalid. As the Federal Circuit explained in *TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016), “there is a significant difference between a petitioner’s burden to establish a ‘reasonable likelihood of success’ at institution, and actually proving invalidity by a preponderance of the evidence at trial.” The PTAB’s finding that Apple has a “reasonable likelihood of success” is a preliminary decision that was made “without the benefit of a full record.” *Id.*; see also *In re Magnum Oil Tools International, Ltd.*, 829 F.3d 1364 (Fed. Cir. 2016) (“[B]ecause of the ‘significant difference’ between the standards of proof at institution and trial during an IPR, see *TriVascular*, 812 F.3d at 1068, it is inappropriate to shift the burden to the patentee after institution to prove that the patent is patentable.”) (footnote omitted).

In its order instituting the IPR, the PTAB accepted Apple’s argument that Hirsch’s reference to an “FFT based spectral analysis” discloses the limitation “generating the frequency spectrum of said audio signal, thereby generating frequency bins of said audio signal.” JX-0144 at 0006-7. This preliminary decision was made without the benefit of a complete record. For

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instance, the PTAB did not have Apple's post-hearing brief before it, in which Apple distinguishes sub-bands generated by DFT filter banks from the claimed "frequency bins." RIB at 9-12. Moreover, in its preliminary response, Andrea did not argue that Hirsch does not disclose "frequency bins." Andrea will have the opportunity to do so in its response.<sup>19</sup>

**b. Apple failed to establish that Mr. Marash and Dr. Berdugo withheld the references with the intent to deceive the PTO.**

Assuming *arguendo* that Hirsch and the Martin references are material, Apple has failed to show by clear and convincing evidence that they were withheld by Mr. Marash and Dr. Berdugo for the purpose of deceiving the PTO. As Apple notes in its post-hearing brief, Mr. Marash and Dr. Berdugo "unquestionably knew of the references" during the prosecution of the '345 patent. Mr. Marash's and Dr. Berdugo's knowledge of the references is unquestionable because they openly and publicly acknowledged the references. Dr. Berdugo co-authored three papers citing and discussing Hirsch and the Martin references that were published during the pendency of the '345 patent's application:

- "Speech Enhancement for Non-Stationary Noise Environments," *Signal Processing*, Vol. 81, No. 11, Nov. 2001, pp. 2403–2418 ("Speech Enhancement article") (RX-0225) at 0001 (discussing Hirsch (reference [11]), Martin 93 (reference [13]), and Martin 94 (reference [94]));

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<sup>19</sup> Of course, Andrea may elect not to raise this argument in the IPR. In its domestic industry contentions, Andrea argues that [REDACTED] runs counter to the argument that Hirsch does not disclose the claimed "frequency bins" because the sub-bands disclosed in Hirsch can be generated [REDACTED]. A party's current litigation strategy, however, cannot transform a reference that is not otherwise material into a material reference.

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- “Spectral Enhancement by Tracking Speech Presence Probability in Subbands,” Proc. JSC’01, Kyoto, Japan, 9-11, April 2001, pp. 95-98 (“Spectral Enhancement article”) (RX-0141C) at 0002 (discussing Hirsch (reference [6]) and Martin 94 (reference [9])); and
- “Noise Estimation by Minima Controlled Recursive Averaging for Robust Speech Enhancement,” IEEE Signal Processing Letters, Vol. 9, No. 1, Jan. 2002 (“Noise Estimation article”) (RX-0431) at 0001 (discussing Hirsch (reference [3]) and Martin 94 (reference [6])).

During the pendency of the ’345 patent, Mr. Marash received copies of these papers and had them posted on Andrea’s website. *See, e.g.*, RX-0140C at 0001-2 (email identifying the Speech Enhancement, Spectral Enhancement, and Noise Estimation articles as papers that should be published on Andrea’s website). In December 2001, Mr. Marash gave a presentation to General Motors Corporation that included four slides describing one of these papers (the Speech Enhancement article). Tr. 494:17-496:21 (Marash); RX-0873C at 0032-35.

If Mr. Marash and Dr. Berdugo were attempting to deceive the PTO by withholding the Hirsch and Martin references, they presumably would not have gone out of their way to broadcast both the references themselves and their familiarity with them. Such conduct is inconsistent with Apple’s theory that Mr. Marash and Dr. Berdugo were withholding the references in order to deceive the PTO.

As evidence of intent to deceive, Apple points to Mr. Marash’s alleged inequitable conduct with respect to U.S. Patent No. 6,198,693 (“’693 patent”) (RX-0218) and the conduct of the prosecuting attorney Thomas Kowalski in this investigation. For the reasons discussed

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below, I find that Apple has failed to show that Mr. Marash committed inequitable conduct with respect to the '693 patent, and I find that Mr. Kowalski's conduct does not evidence that either Mr. Marash or Dr. Berdugo committed inequitable conduct with respect to the '345 patent.

**i. Apple failed to show that Mr. Marash committed inequitable conduct with respect to the '693 patent.**

The '693 patent is entitled "System and Method for Finding the Direction of a Wave Source Using an Array of Sensors" and issued on March 6, 2001 from an application filed on April 13, 1998. RX-0218 at 0001. Mr. Marash is the '693 patent's sole named inventor. *Id.* Apple alleges that Mr. Marash committed inequitable conduct with respect to the '693 patent by failing to identify the authors of a paper as co-inventors in order to avoid sharing rights in the patent with other companies and individuals. RIB at 121-22. The paper at issue is "On Direction Finding of an Emitting Source from Time Delays" (the "Direction Finding paper") (RX-0210C) by Dr. Berdugo, Miriam Doron, Judith Rosenhouse, and Halm Azhari. Other than Dr. Berdugo, none of the other co-authors were employed by Andrea or its subsidiary, Lamar. RX-0210C at 0001. In support of its contention, Apple points to excerpts in the '693 patent that appear to have been copied from the Direction Finding paper.

Although the '345 patent incorporates the '693 patent by reference, Apple is not arguing that the alleged inequitable conduct with respect to the '693 patent infects the '345 patent, so as to render it unenforceable. Tr. at 65:15-20. Rather Apple is arguing that Mr. Marash's alleged misconduct with respect to the '693 patent evidences Mr. Marash's intent to deceive the PTO with respect to the '345 patent. RIB at 122 ("The conclusive evidence of Mr. Marash's egregious misconduct in obtaining his '693 patent—which he applied for less than a year before filing the '345 patent application—shows that he had no qualms about deceiving the PTO for his



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personal gain.”). Apple further argues that Dr. Berdugo acquiesced to Mr. Marash’s alleged fraud with respect to the ’693 patent, and that his acquiescence “shows that Mr. Berdugo was also willing to deceive the PTO for his and his employer’s personal gain.” *Id.*

As discussed below, I find that the portions of the paper incorporated into the ’693 patent relate to the technological background of the ’693 patent, rather than the novel aspects of the claimed invention. I further find that the paper’s co-authors did not make an inventive contribution to the subject matter claimed by the ’693 patent and that Mr. Marash did not commit inequitable conduct with respect to the ’693 patent.

**(A) Portions of the ’693 patent were copied into the ’693 patent application without attribution.**

Excerpts of the ’693 patent closely mirror excerpts from the Direction Finding paper. For example,

The time delay between any two sensors is equal to the projection of the distance vector between them along the  $\mathbf{k}$  vector divided by the sound velocity. Thus, the  $T_d$  vector can be expressed as follows:

$$T_d = -(\mathbf{R}\mathbf{k})/c$$

RX-0218 at col. 7:60-64

The time delay between any two sensors is equal to the projection of the distance vector between them along the  $\mathbf{k}$  vector divided by the sound velocity. Consequently, the delay vector can be expressed as follows:

$$\vec{T} = -\frac{\mathbf{R}\mathbf{k}}{c}, \quad \mathbf{R} = \begin{bmatrix} \vec{r}_2 - \vec{r}_1 \\ \vdots \\ \vec{r}_M - \vec{r}_1 \end{bmatrix}, \quad (3)$$

RX-0210C at 0002

Compare RX-0218 at col. 8:50-67 with RX-0210C at 0002. The application that led to the '693 patent was filed on April 13, 1998. RX-0218 at 0001.<sup>20</sup> The Direction Finding paper was submitted for publication on February 20, 1998, almost two months before filing date of the '693 patent. RX-0210C at 0001. Moreover, drafts of the paper existed as early as August 12, 1997. RX-0167 at 0116. It is uncontroverted that Mr. Marash had access to the Direction

<sup>20</sup> Apple also identifies lines 22-28 of column 8 as being copied from the Direction Finding paper. Although this excerpt appears to have been copied from the Direction Finding paper, the '693 patent clearly indicates the original source of this material by citing to "Applied Optimal Estimation, the MIT Press, p. 103" by Arthur Gelb ("Gelb"), which is similarly cited in the Direction Finding paper. Compare RX-0218 at col. 8:22-28, 8:50-67 with RX-0210C at 0002. Whether he should have cited the Direction Finding paper in addition to Gelb, Mr. Marash clearly was not seeking to take credit for the material.

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Finding article prior to its publication. At the time, Mr. Marash was president of Lamar Signal Processing and the authors thanked “Lamar Signal Processing Israel for providing the facilities and for their assistance in performing the experiments.” RX-0210C at 0007. Mr. Marash admitted at the hearing that he had access to the paper before its publication. Tr. at 513:2-6.

Given the similarity between the excerpts and Mr. Marash’s access to the article, I find that the excerpts from the ’693 patent were copied from Direction Finding paper.

**(B) The copied portions of the Direction Finding paper do not show that the paper’s authors are co-inventors of the ’693 patent.**

Apple points to the copied portions of the Direction Finding paper to show that Mr. Marash failed to identify the paper’s authors as co-inventors of the ’693 patent. RIB at 122. Under 35 U.S.C. 102(f), a patent is required to accurately list the correct inventors of a claimed invention. *Pannu v. Iolab Corp.*, 155 F.3d 1344, 1349 (Fed. Cir. 1998). In order to be joint inventors, the authors of the Direction Finding paper must have

(1) contribute[d] in some significant manner to the conception or reduction to practice of the invention, (2) ma[d]e a contribution to the claimed invention that is not insignificant in quality, when that contribution is measured against the dimension of the full invention, and (3) do[ne] more than merely explain to the real inventors well-known concepts and/or the current state of the art.

*Id.* The copied portions of the Direction Finding paper do not show that the paper’s authors made an inventive contribution to the subject matter claimed by the ’693 patent.

All of the copied excerpts from the Direction Finding paper relate to determining the sound’s direction by using the time delay in the detection of a sound between microphones. The ’693 patent does not purport to claim that the use of time delays between microphones to determine a sound’s direction is novel. The ’693 patent expressly acknowledges that such techniques were known at the time of the invention. RX-0218 at col. 2:6-26. As an example of

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one such prior art method, the '693 patent discusses at length the paper "Voice Source Localization for Automatic Camera Pointing System in Videoconferencing" by Hong Wang and Peter Chu ("Voice Source paper"). *Id.* at col. 2:6-62. The Voice Source paper was published in April 1997, four months before the earliest draft of the Direction Finding paper. *Id.* at col. 2:7-14. The Direction Finding paper itself acknowledges that determining the direction of a sound source by estimating the time delay between two microphones was a "common approach" that had been developed decades before either the Direction Finding paper or the '693 patent application. RX-0210C at 0001 (citing papers published in 1976, 1979, and 1981). It is not credible that Mr. Marash intended to claim such well-known techniques, or that the examiner—who is deemed to have "scientific competence in the field[] in which [he] work[s]"—would have interpreted the '693 patent application as claiming these well-known techniques. *In re Berg*, 320 F.3d 1310, 1315 (Fed. Cir. 2003). At most the copied excerpts show that Mr. Marash relied on the Direction Finding paper to "explain . . . well-known concepts and/or the current state of the art." *Pannu*, 155 F.3d at 1349. Accordingly, the copied excerpts do not show that the authors of the Direction Finding paper are co-inventors of the '693 patent.

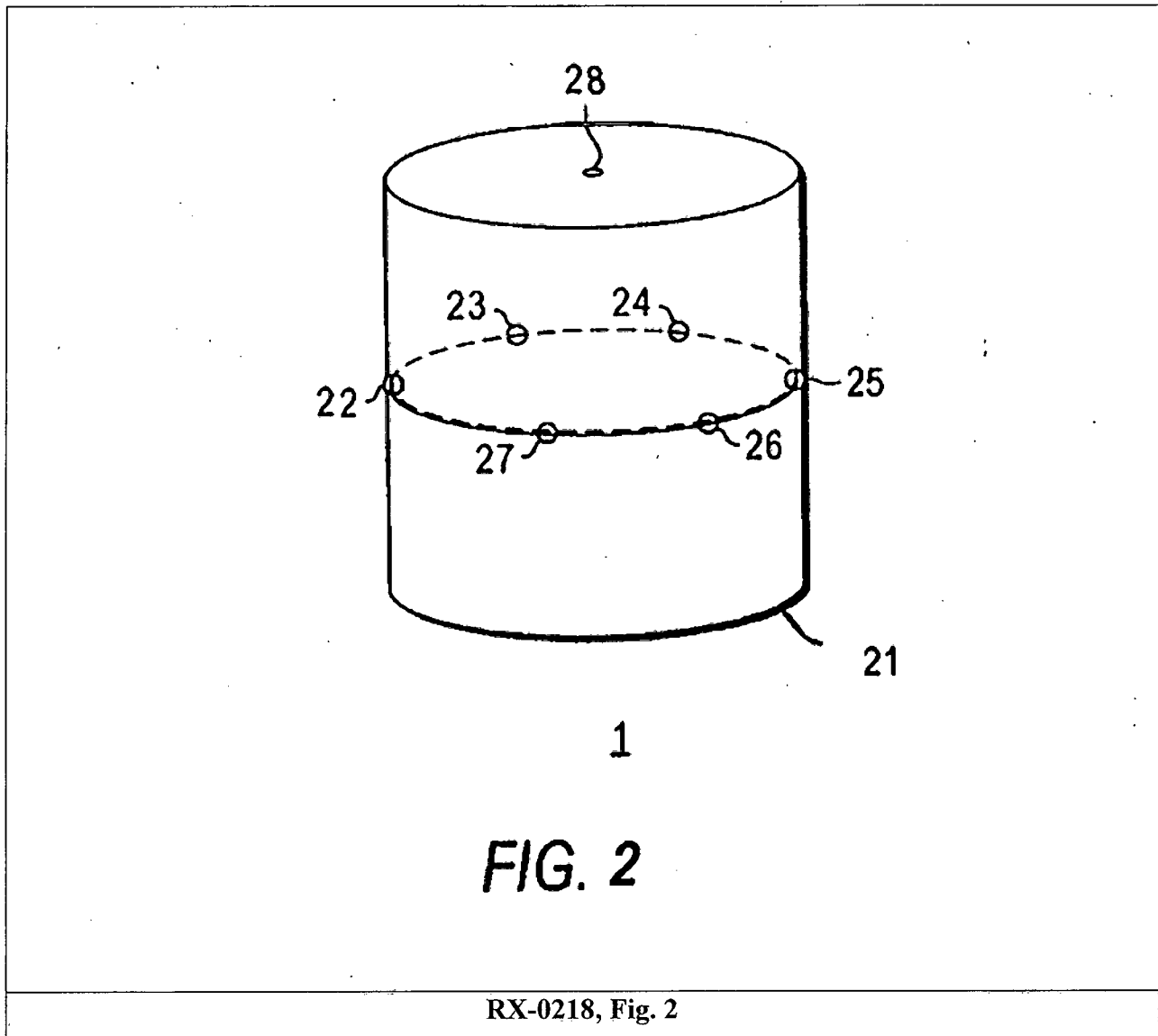
**(C) The authors of the Direction Finding paper are not co-inventors of the '693 patent.**

Although they generally relate to using the time-delay between microphones to determine the direction of sound, the techniques disclosed in the '693 patent and the Direction Finding paper are significantly different. Because of their dissimilarity, I find that the authors of the Direction Finding paper did not make an inventive contribution to the '693 patent.

The direction-finding technique disclosed in the '693 patent is a two-step process in which the approximate direction of a sound received by a microphone array is first determined

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and then the approximate direction is used to determine the precise distance. '693 patent at col. 13:3-7 ("a precise-direction finder . . . for finding the precise direction of the wave source by further processing the signals representing the waves based on the approximate direction"). A microphone array used in a preferred embodiment of the '693 patent is shown in Figure 2.



Microphones 22-27 are mounted on the array's periphery, and microphone 28 is mounted on the upper, center of the array. RX-0218 at col. 4:47-56. Each peripheral microphone is paired with an adjacent peripheral microphone. *Id.* at col. 5:62:-col. 6:6. For each pair of microphones, the

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difference (if any) in the phase of the sound received by the two microphones is determined. *Id.* at col. 6:31-34. The approximate direction corresponds to the pair in which the phase difference between the two microphones is smallest. *Id.* at col. 6:34-38; *see also* at col. 12:66-col. 13:2 (claim 1) (“an approximate-direction finder . . . to find the approximate direction of the wave source in terms of a sensor pair selected among the sensors”).

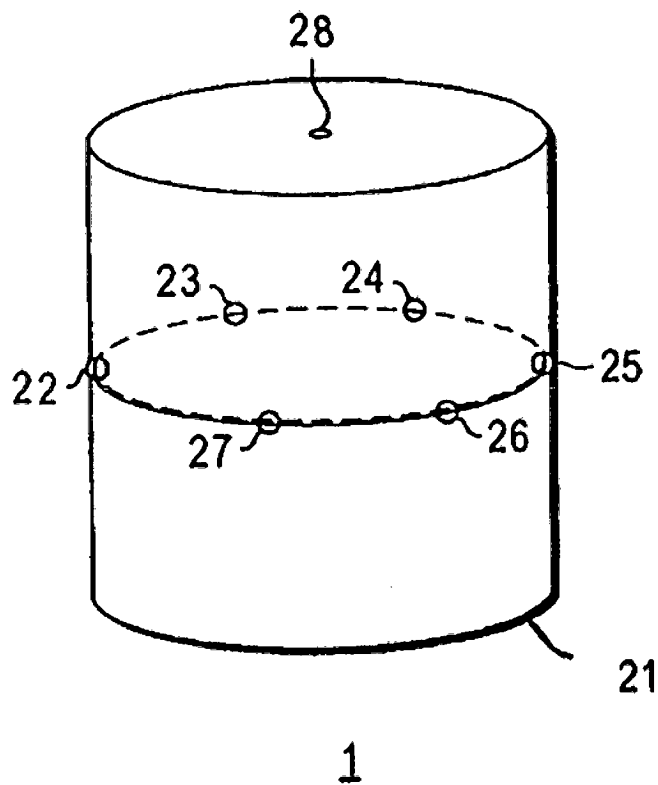
The pair of microphones corresponding to the approximate direction is selected to serve as the focal point for a “sector.” *Id.* at col. 6:34-38. The sector consists of the selected microphone pair, one of the two peripheral microphones that are adjacent to the selected pair, and the upper, center microphone. *Id.* at col. 6:49-52. Of the two peripheral microphones adjacent to the selected pair, “the one with a higher zero-delay cross correlation” is selected for the sector. *Id.* at col. 6:49-54. The microphones selected for the sector are used to determine the precise direction of the sound.

Unlike the '693 patent, the Direction Finding paper does not disclose a two-step process for determining the precise direction of a sound. Rather it discloses two alternative methods for determining the direction of a sound. The time delay direction finding (“TDDF”) algorithm determines the direction of sound using the “estimated time delays between the array elements (referred to as the time delay vector).” RX-0210C at 0001. While the article teaches an “optimal” method for estimating the time delay vector, it cautions that the optimal estimate is not easily obtained in “practical applications.” *Id.* As an alternative, a “suboptimal” estimate of the time delay vector can be used. *Id.* The optimal estimate and the sub-optimal estimate are substitutes for each other, not complements. If one could implement a system using the optimal time-delay estimate there would be no reason to use the sub-optimal time-delay estimate. Accordingly, although Apple argues the sub-optimal estimate corresponds to the '693 patent's

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“approximate direction” and the optimal estimate corresponds to the ’693 patent’s “precise direction,” there is no suggestion in the Direction Finding paper that the results from using the suboptimal time-delay estimate can be honed into a more precise estimate using the optimal time-delay estimate.

Further, the method for calculating the sub-optimal time-delay vector estimate—which Apple and its expert, Dr. Kyriakakis, identify as corresponding to the ’693 patent’s technique for determining approximate direction—is not determined by selecting the pair of microphones with the least phase difference between the microphones. The suboptimal time-delay vector is determined by estimating the “time delays between the first sensor relative to all the other sensors in the array.” RX-0210C at 0009. In order to illustrate the difference between the methods, reference is made to the microphone array depicted in Figure 2 of the ’693 patent.



**FIG. 2**

RX-0218, Fig. 2

As discussed above, the '693 patent teaches pairing each peripheral microphone with an adjacent peripheral microphone. RX-0218 at col. 5:62-col. 6:6. In the Figure 2 example, pairing the adjacent peripheral microphones results in three pairs, *e.g.*, 22-23, 24-25, and 26-27. The approximate direction of the sound source is determined by identifying the pair of microphones in which there is the least phase difference, *e.g.*, 22-23. *Id.* at col. 6:34-38; *see also* at col. 12:66-col. 13:2 (claim 1) (“an approximate-direction finder . . . to find the approximate direction of the wave source in terms of a sensor pair selected among the sensors”).



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In contrast, the Direction Finding paper teaches that, in order to determine a sound's direction using the suboptimal time-delay vector, a microphone in the array is selected as a reference microphone and is used to form pairs with each of the other microphones. RX-0210C at 0009. For example, if microphone 22 is selected as the reference microphone, it will be used to form five pairs from the remaining peripheral microphones: 22-23, 22-24, 22-25, 22-26, and 22-27. In addition, microphone 22 would be paired with upper, central microphone 28 to form a sixth pair of microphones (22-28). Accordingly, in this example determining the suboptimal time-delay vector utilizes twice as many microphone pairings as the approximate-direction method. Additionally, of the nine pairs of microphones used in the two methods, only one is common between the two methods (22-23). Moreover, the suboptimal-time-delay-method does not estimate the direction of the sound by identifying the microphone pair that has the least phase difference, but uses all of the time-delay vectors derived from the microphone pairs to calculate an overall time delay vector. *Id.* at 0002.

Given the dissimilarity between the techniques disclosed in the Direction Finding paper and the '693 patent, I find that the inventors did not contribute to the inventive subject matter of the '693 patent and that Mr. Marash did not commit inequitable conduct by failing to identify them as inventors.

**ii. Mr. Kowalski's conduct does not show that Mr. Marash or Dr. Berdugo committed inequitable conduct.**

Mr. Kowalski prosecuted the '345 patent while at the firm Frommer Lawrence & Haug LLP ("FLH"). JX-0001. On September 22, 2010, Mr. Kowalski left FLH and went to Vedder Price P.C. ("Vedder"), where he is currently a partner. Tr. at 691:6-14. As reflected in a number of orders, Mr. Kowalski was not cooperative in responding to third-party discovery propounded

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in this investigation. Order No. 20 (Mar. 17, 2017) (denying Mr. Kowalski and Vedder's motion to quash subpoenas *ad testificandum* and *duces tecum*); Order No. 25 (Apr. 25, 2017) (ordering Andrea to secure the cooperation of Mr. Kowalski and Vedder); Order No. 43 (July 21, 2017) (granting Mr. Kowalski's motion to quash hearing subpoenas); Order No. 44 (July 21, 2017) (imposing sanctions against Andrea regarding the use of Mr. Kowalski's deposition). In response to the respondents' subpoenas, Mr. Kowalski and Vedder initially represented that the prosecution files relating to the patents had not been transferred to Vedder from FLH. Tr. at 691:6-15. Mr. Kowalski admitted that this representation was false and that Vedder had in fact received files from FLH that were responsive to the respondents' subpoenas. *Id.* at 693:8-11. Apple argues that this misrepresentation "is consistent with an attempt to cover up Andrea's inequitable conduct in procuring the '345 patent," and that "Mr. Kowalski's willingness to prevaricate also establishes that the named inventors found a copacetic partner for their misconduct." RIB at 123.

Apple's argument is undermined by the fact that Mr. Kowalski and Vedder corrected their original misrepresentation and produced the documents that Vedder received from FLH that were responsive to the respondents' subpoenas. Tr. at 693:2-17. While it is true that Mr. Kowalski was unable to provide a credible explanation for the initial response, it also that true Mr. Kowalski and Vedder amended their initial response and produced the documents. Tr. at 693:8-11 ("After we realized that this statement was not entirely correct, there was, indeed, review and I understand produce— production of documents from what was delivered to us from

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FLH.”).<sup>21</sup> If Vedder and Mr. Kowalski’s initial response was part of a “cover-up,” as alleged by Apple, there is no explanation as to why Mr. Kowalski and Vedder abandoned the cover-up.

### **B. Equitable Estoppel**

Apple argues that Andrea’s suit is barred by equitable estoppel. RIB at 125-26. The basis for Apple’s equitable estoppel defense is an “MFi Development License” that Apple granted Andrea on July 29, 2014 (RX-0404C). In the license, Andrea “represents and warrants that (i) it has no knowledge that any product of Apple, or any of its Affiliates, infringes any patent owned or controlled by” Andrea. RX-0404C at 0003. Before it was terminated, the license automatically renewed in July 2015 and July 2016. Apple argues that automatic renewals reaffirmed Andrea’s initial representation that it was unaware that Apple’s products infringed its patents. RIB at 125. Apple argues that “[h]ad Andrea either brought an earlier suit or corrected its representations regarding Apple’s alleged infringement, Apple would have had an opportunity to implement alternative solutions years earlier and avoided any potential need to implement design arounds for the later launched Apple Watch and Apple AirPods products.” *Id.* at 125-26.

#### **1. Legal Standards**

In order to prove that Andrea’s suit is equitably estopped, Apple must establish that

(1) the patentee, through misleading conduct (or silence), leads the alleged infringer to reasonably infer that the patentee does not intend to enforce its patent against the alleged infringer; (2) the alleged infringer relies on that conduct; and (3) the alleged infringer will be materially prejudiced if the patentee is allowed to proceed with its claim.

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<sup>21</sup> Although Mr. Kowalski claimed that the initial response to Apple’s subpoenas was based on a misimpression on the part of him and Vedder that the scope of Apple’s subpoenas was commensurate with the scope of an earlier subpoena by Dell, Mr. Kowalski testified that he “didn’t even know what is in the Dell subpoena.” *Compare* Tr.at 693:12-17 *with id.* at 693:24-694:5.

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*High Point SARL v. Sprint Nextel Corp.*, 817 F.3d 1325, 1330 (Fed. Cir. 2016) (quoting *Radio Sys. Corp. v. Lalor*, 709 F.3d 1124, 1130 (Fed. Cir. 2013)) (internal quotation marks omitted).

### 2. Discussion

Even if Apple could have “reasonably infer[red]” from the MFi Development License that Andrea did not intend to enforce the ’345 patent against Apple when the agreement was signed in July 2014, Andrea provided explicit notice that Apple was infringing Andrea’s patents in May 2015. Complaint, Exhibit 8; *see* JX-0019C (Andrea Dep. Tr.) at 37-38. Apple does not identify any evidence that it relied on Andrea’s representation in the MFi Development License when implementing its noise suppression algorithms. Moreover, the time elapsed between the May 2015 notice and the September 2016 filing of the complaint was more than enough time for Apple to implement its purported design arounds. *See* RX-0009C (Iyengar WS) at Q/A 6-8, 11-13. Apple thus cannot carry its burden on equitable estoppel.

## VIII. DOMESTIC INDUSTRY

Andrea contends that its activities relating to the development and delivery of its Segment 300 products satisfy the domestic industry requirement under subsections (A), (B), and (C) of Section 337(a)(3) (19 U.S.C. § 1337(a)(3)(A)-(C)).

### A. Legal Standards

In patent-based proceedings under Section 337, a complainant must establish that an industry “relating to the articles protected by the patent . . . exists or is in the process of being established” in the United States. 19 U.S.C. § 1337(a)(2). Subsection (3) of Section 337(a) provides:

For purposes of paragraph (2), an industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned –

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- (A) significant investment in plant and equipment;
- (B) significant employment of labor or capital; or
- (C) substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. § 1337(a)(3). The domestic industry (“domestic industry” or “DI”) requirement of Section 337 consists of an “economic prong” and a “technical prong.” *Certain Stringed Musical Instruments and Components Thereof* (“*Stringed Musical Instruments*”), Inv. No. 337-TA-586, Comm’n Op. at 13, 2009 WL 5134139, at \*10 (April 24, 2008).

Under the technical prong, “the Commission examines whether the industry produces articles covered by the asserted claims.” *Alloc v. Int’l Trade Comm’n*, 342 F.3d 1361, 1375 (Fed. Cir. 2003). “The test for satisfying the ‘technical prong’ of the industry requirement is essentially [the] same as that for infringement, *i.e.*, a comparison of domestic products to the asserted claims.” *Id.* The complainant must establish that it practices at least one claim of the asserted patent. *Certain Point of Sale Terminals and Components Thereof*, Inv. No. 337-TA-524, Order No. 40 at 17-18 (April 11, 2005).

Under long-standing practice and in accordance with section 337(a)(2)’s express requirement that a domestic industry in the United States must relate to the “articles protected by the patent,” and section 337(a)(3)’s requirement that a domestic industry be established “with respect to the articles protected by the patent,” the economic prong requires that significant or substantial expenditures be allocable to an article that practices the patent. *Certain Integrated Circuit Chips And Products Containing The Same* (“*Integrated Circuit Chips*”), Inv. No. 337-TA-859, Comm’n Op. at 47-51 (Aug. 22, 2014).

### **B. Domestic Industry Products**

Andrea relies on its Segment 300 products to satisfy the domestic industry requirement,

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identifying specific products that implement versions of its PureAudio algorithm (the “DI products”). Andrea divides the DI products into six categories and asserts that each category practices or embodies all or a subset of claims 4-11, 13, 14, 17, 21, 23, 25, 38-40, 43, 46, and 47 of the ’345 patent. The table below identifies the categories of DI products and the corresponding asserted claims.

<b>DI Products</b>	<b>’345 Patent Claims</b>
<b><i>DA-250 Products</i></b> <ul style="list-style-type: none"> <li>• DA-250 (all customers)</li> <li>• DA-250 II (all customers)</li> <li>• DA-250 F (all customers)</li> <li>• DA-250 Q (all customers)</li> </ul>	4-11, 13, 14, 17, 21, 23, 25, 38-40, 43, 46, and 47
<b><i>Windows Products</i></b> <ul style="list-style-type: none"> <li>• Array-2S (all versions)</li> <li>• Audio Commander (version for Windows)</li> <li>• Samson</li> </ul>	4-11, 13, 14, 17, 21, 23, 25, 38-40, 43, 46, and 47
<b><i>ADSP-21xx Products</i></b> <ul style="list-style-type: none"> <li>• Clever Devices Public Transit</li> <li>• DA-350 (all customers)</li> </ul>	4-11, 13, 14, 21, 25, 38-40, 43, and 46
<b><i>Teaklite Products</i></b> <ul style="list-style-type: none"> <li>• Bosch Speech Group</li> </ul>	4-11, 13, 14, 17, 21, 25, 38-40, 43, 46, and 47
<b><i>iPhone/iPad Products</i></b> <ul style="list-style-type: none"> <li>• iPhone/iPad Apps</li> </ul>	4-11, 13, 14, 17, 21, 25, 38-40, 43, 46, and 47
<b><i>Audio Software Products for Mac</i></b> <ul style="list-style-type: none"> <li>• Audio Commander (version for Mac)</li> </ul>	4-11, 13, 14, 17, 21, 25, 38-40, 43, 46, and 47

**C. Technical Prong**

Andrea asserts that the DI products literally practice all or a subset of claims 4-11, 13, 14, 17, 21, 23, 25, 38-40, 43, 46, and 47 of the ’345 patent. CIB at 46-75. Claims 4-11, 13, 14, 17, 21, 23, and 25 depend from independent claim 1. Claims 39, 40, 43, 46, and 47 depend from independent claim 38. Claims 1 and 38 have similar limitations, and the parties’ contentions with respect to each limitation are addressed below.

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1. Independent Claims 1 and 38

- a. **“an input for inputting an audio signal which includes a noise signal” (claim 1)/“inputting said audio signal which includes said noise signal” (claim 38)**

There is no dispute between the parties that the DI products include an input for inputting an audio signal.<sup>22</sup> Mr. DeJaco identifies these inputs in his witness statement. CX-0007C at Q/A 1228-1273.

- b. **“a frequency spectrum generator for generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal” (claim 1)/“generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal” (claim 38)**

The asserted claims require a means or step of generating the frequency spectrum of a signal so as to generate “frequency bins.” ’345 patent at col. 9:38-40 (claim 1), col. 12:11-14 (claim 38). The parties agreed that the claimed “frequency bins” are “frequency domain outputs extending between two limiting frequencies.” Order No. 34 at 1-2. Apple and Staff argue that the DI products do not satisfy the “frequency bin” limitation because the DI products split the audio signal into sub-bands that are in the time domain, not the frequency domain. RIB at 49-50; SIB at 22-24.

It is undisputed that the DI products [REDACTED] an audio signal using the technique described in U.S. Patent No. 6,377,637 (RX-0051, the “’637 patent”).<sup>23</sup> See Andrea’s Opposition to Respondents’ Motion for Summary Determination of No Domestic Industry (June 22, 2017), Response to Respondents’ Undisputed Material Fact No. 12

<sup>22</sup> There is also no dispute regarding the technical prong with respect to the preambles of claim 1 and claim 38, which do not appear to be limiting.

<sup>23</sup> As noted above, the ’637 patent was originally asserted in this investigation but was terminated pursuant to Order No. 31 (May 10, 2017). See Comm’n Notice (May 25, 2017).

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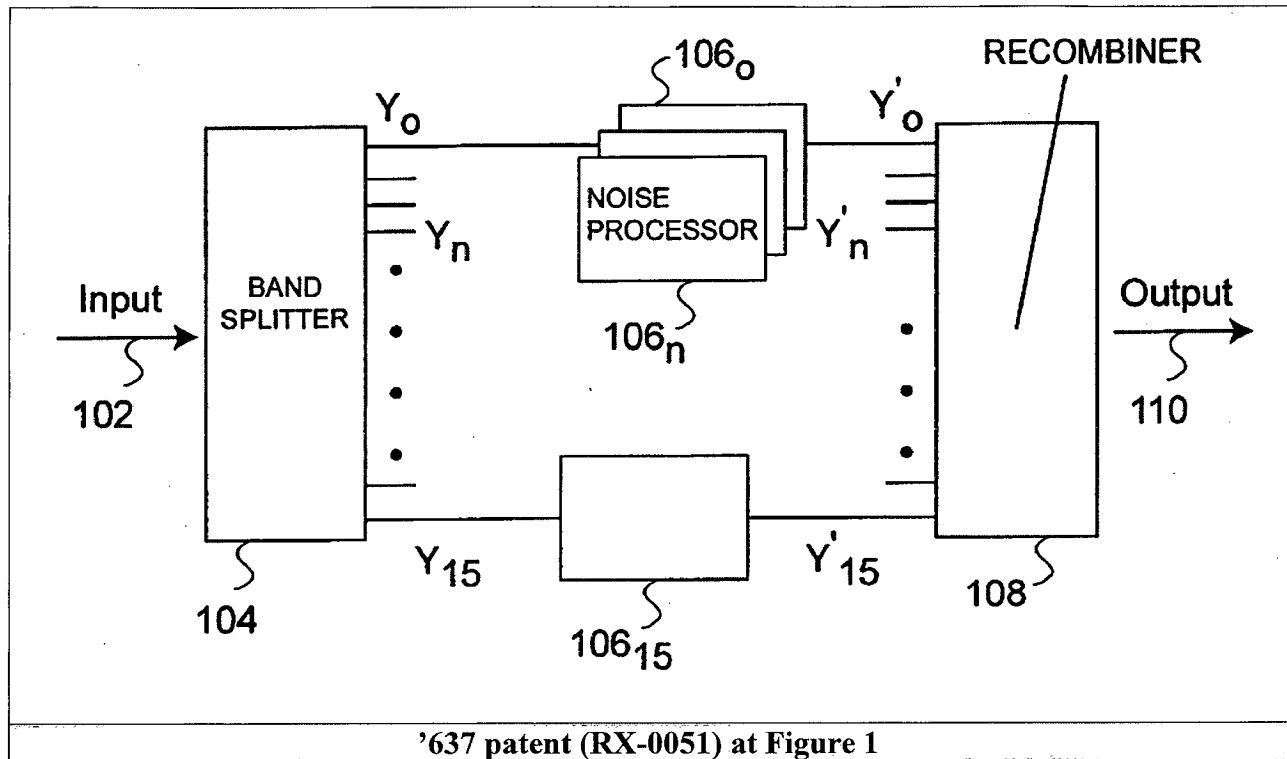
(indicating that it is undisputed that “Andrea’s products split an audio signal using the technique described in the ’637 patent”); *see also Tr. (DeJaco)* at 320:18-22.<sup>24</sup> The application for the ’637 patent was filed more than a year after the application for the ’345 patent, and the named inventor of the ’637 patent is Baruch Berdugo, one of the co-inventors of the ’345 patent. RX-0051. The specification of the ’637 patent explicitly discusses the application that issued as the ’345 patent, noting that the method described in the ’345 patent “require[s] complex and computationally intense FFT calculations in order to operate on the data while in the frequency domain.” RX-0051 at col. 2:56-59 (referring to “U.S. patent Ser. No. 09/252,874,” which issued as the ’345 patent). One of the objects of the ’637 patent is to avoid such complex calculations in favor of “a simple, yet efficient mechanism, to estimate and subtract noise.” *Id.* at col. 3:4-8. To attain its objectives, the ’637 patent discloses a method that includes “a band splitter for dividing the digital input signal into a number of frequency-limited time-domain signal sub-bands.” *Id.* at col. 3:22-24.

The detailed description of the invention of the ’637 patent describes a band splitter that generates 16 frequency-limited time domain sub-bands. RX-0051 at col. 4:49-5:52. Figure 1 illustrates an overview of the noise cancellation system taught by the ’637 patent.

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<sup>24</sup> There are no relevant differences among the DI products with respect to the split function. *See Tr. (DeJaco)* at 318-319.





'637 patent (RX-0051) at Figure 1

The system shown in Figure 1 receives a digital audio signal at input 102. *Id.* at col. 4:34-35. The signal is then passed through band-splitter 104, which “divides the signal into 16 time domain sub-band signals  $Y_n$  ( $Y_0$ - $Y_{15}$ ).” *Id.* at col. 4:49-51. Each sub-band is processed by a separate noise processor (106<sub>n</sub>) that “reduce[s] the noise signal in each sub-band while maintaining the source (voice) signal.” *Id.* at col. 4:51-54. The noise-free sub-bands are then recombined into a single output signal by recombiner 108. *Id.* at col. 4:57-61. Throughout this process, the sub-band signals are consistently described in the '637 patent as time domain signals. *See, e.g., id.* at 4:50 (“16 time domain sub-band signals”), 5:11-12 (“16 output points each representing 1 time domain sample per frequency band”). In the detailed discussion of the recombiner, the specification notes that “both the input and output are time domain signals.” *Id.* at col. 7:17-20. The '637 patent explicitly claims an advantage over prior art that operates in the “frequency domain.” *See id.* at 7:43-50 (“It will be appreciated that the present invention processes input data on a continuous basis in groups of as few as 8 data points 202. This

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provides a throughput advantage over related art systems that process in the frequency domain and must wait until sufficient data points, for example 1024, are accumulated before performing FFT processing.”).

The specification of the '637 patent clearly describes an algorithm that splits the signal into time domain sub-bands, not frequency domain outputs. Joseph Marash, one of the named inventors of the '345 patent, admitted that the '637 patent “is done in the time domain,” while “[t]he other one [’345 patent] is done in the frequency domain.” Tr. at 484-485. Andrea’s contract engineer, Benjamin Faber, also admitted that [REDACTED] [REDACTED]. JX-0023C (Faber Dep.) at 129:3-6. Apple’s expert, Dr. Michael Spencer, analyzed the source code of the Andrea DI products to confirm that the [REDACTED] the signal into sub-bands in the time domain using the technique described in the '637 patent. RX-0005C at Q/A 62-139. Dr. Spencer explained that splitting signals into sub-bands is a common operation in signal processing, which “generate[s] time domain sub-band signals instead of frequency bins.” RX-0005C at Q/A 43; *see also* RX-0003C (Kyriakakis RWS) at Q/A 21 (“It is common in signal processing to divide a broadband signal into a set of frequency-limited signals that remain in the time domain. . . . But the signals are not in the frequency domain, because each signal can still be played over loudspeakers.”). Staff agrees with Apple that the Andrea DI Products cannot generate the frequency domain outputs required by the claims of the '345 patent, based on the description of the algorithm in the '637 patent. SIB at 22-24. In the context of this evidence, I agree with Apple and Staff that the frequency-limited time domain sub-bands of the Andrea DI products, as described in the '637 patent, cannot meet the frequency bin limitation of the '345 patent.

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Rather than pointing to the time domain sub-bands as the claimed frequency domain representation, Andrea identifies [REDACTED]. Andrea relies on Mr. DeJaco's analysis of the [REDACTED] used in the DI products, where he identifies certain [REDACTED] operations. CX-0007C at Q/A 1274-1325. Mr. DeJaco points to [REDACTED] [REDACTED] *Id.* at Q/A 1277; *see also id.* at Q/A 1283, 1299, 1303, 1307, 1311, 1325. As disclosed in the '637 patent, however, the FFT is only an intermediate step of the splitting function that splits the signal into sub-bands. In this splitting process described in the '637 patent, the FFT does not convert an input signal to its frequency representation—there are several complex processing steps both before and after the FFT, depicted in Figure 2:

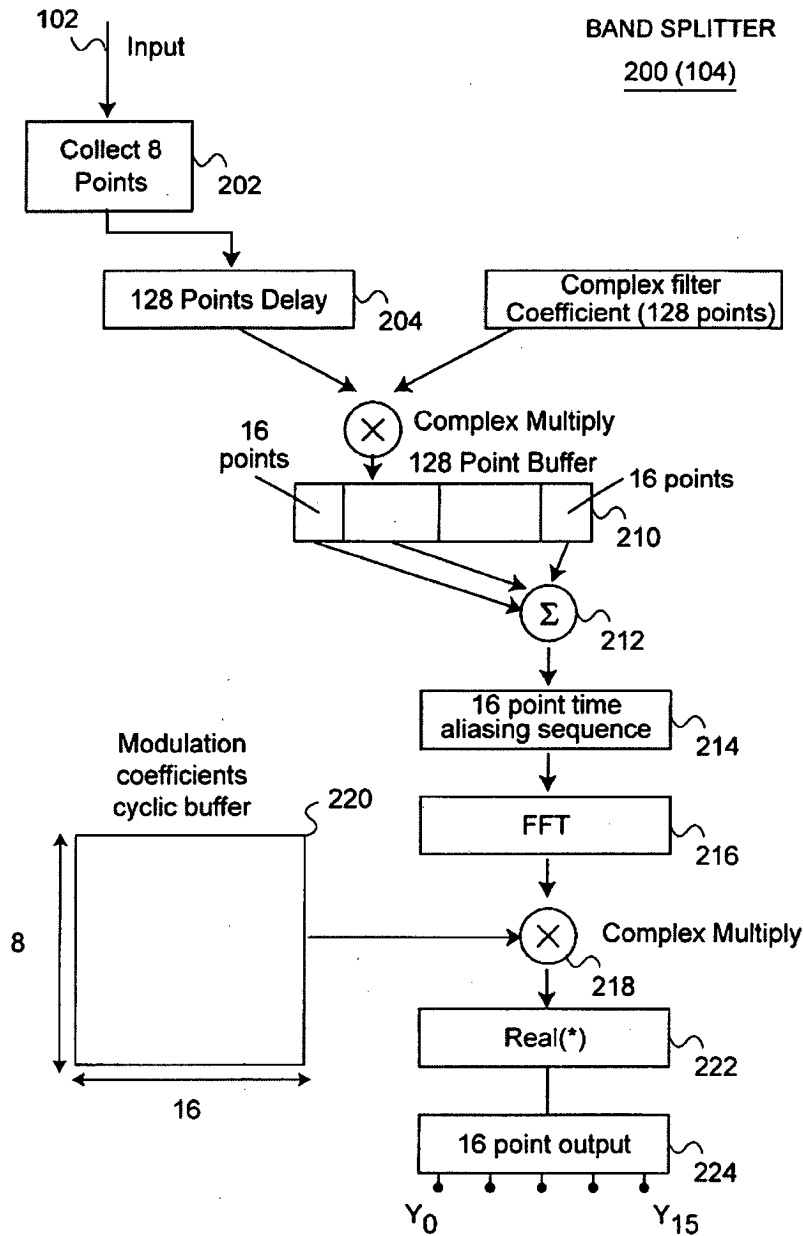


FIG. 2

RX-0051 at Fig. 2. The specification of the '637 patent describes these processing steps:

In more detail, the input signal 102 is collected as 8 input points 202 that are stored in a 128 tap delay line 204 representing a 128 point input vector which is multiplied via a multiplier 206 by the coefficients of a 128 point complex coefficient pre-designed filter 208. The 128 complex points result vector is folded by storing the multiplication result in the 128 point buffer 210 and summing the first 16 points with the second 16 points and so on using a summer 212. The

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folded result, which is referred to as an aliasing sequence 214, is processed through a 16 point Fast Fourier Transform (FFT) 216. The output of the FFT is multiplied via a multiplier 218 by the modulation coefficients of a 16 point modulation coefficient cyclic buffer 220. The cyclic buffer which contains, for example, 8 groups of 16 coefficients, selects a new group each cycle. The real portion of the multiplication result is stored in the real buffer 222 as the requested 16-point output 224.

*Id.* at col. 5:15-31. This sub-band splitting algorithm does not generate the “frequency spectrum of said audio signal,” even in the intermediate FFT step. As explained by Dr. Spencer, the FFT “does not operate on a raw set of audio samples. Instead, it operates on the complex time aliasing data sequence, that was generated by windowing the input signal and then folding into a shorter sequence.” RX-0005C at Q/A 93. The windowing and time aliasing thus transform the signal in a particular way to use the FFT as part of the process of splitting the signal into 16 sub-bands. The output of the FFT consists of intermediate values that are not frequency domain outputs representing a frequency spectrum of the audio signal. The ’637 patent makes this distinction explicitly in the context of an inverse FFT (IFFT), explaining that “[t]he process goes through an Inverse Fast Fourier Transform (IFFT) process but both the input and output are time domain signals.” RX-0051 at col. 7:17-20. Although an FFT or IFFT can be used to convert signals between the time domain and the frequency domain, that is not how these processes are being used in the ’637 patent or the Andrea DI products. Mr. DeJaco’s identification of [REDACTED] in the source code does not show that the DI products practice the frequency spectrum limitation of the ’345 patent.

In the face of this evidence, Andrea argues for a more flexible interpretation of the frequency domain and the time domain. Mr. DeJaco offers testimony that the Andrea DI products represent a hybrid “time-frequency domain analysis.” CX-0007C at Q/A 15. There is no reference to this type of hybrid analysis in the ’345 or ’637 patents, however, which make

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explicit distinctions between the frequency domain and the time domain. The '345 patent describes signals that “are converted to the frequency domain through an FFT (Fast Fourier Transform) processor” and an “Inverse Fourier Transform on the complex noise free data to provide 512 time domain points.” '345 patent at col. 5:10-12, 5:21-24. The '637 patent, in contrast, seeks to avoid “complex and computationally intense FFT calculations in order to operate on the data while in the frequency domain.” RX-0051 at col. 2:56-59. When describing an inverse FFT used to recombine its sub-bands, the '637 patent emphasizes that “both the input and output are time domain signals.” RX-0051 at col. 7:17-20. Andrea’s suggestion that the '345 and '637 patents operate in some kind of hybrid time-frequency domain is attorney argument backed only by unsupported expert testimony. The record evidence points to the clear conclusion that the Andrea DI products, using the algorithm described in the '637 patent, generate frequency-limited time domain sub-bands. And these time domain sub-bands do not meet the frequency spectrum generator limitations of the '345 patent that require a frequency spectrum consisting of frequency bins of the audio signal.<sup>25</sup>

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<sup>25</sup> Andrea raises a few additional arguments in its post-hearing brief that do not appear to have been disclosed in its pre-hearing brief. In particular, Andrea argues that because both the '345 and '637 patents describe similar noise estimation processes, the methods disclosed in both patents must operate in the frequency domain. CIB at 56-64. As part of this argument, Andrea appears to point to a different part of the source code for the Andrea DI products, arguing that the magnitude of each sub-band, [REDACTED], is a frequency domain representation of the signal. *Id.* at 57-58. This is not consistent with Andrea’s pre-hearing brief, however, where Andrea’s infringement contentions relied on Mr. DeJaco’s analysis and pointed to the [REDACTED]. *See* CPHB at 293-297. To the extent that Andrea is attempting to advance a new argument based on the magnitude of each sub-band that is used in the threshold detection step, this theory is barred pursuant to Ground Rule 8.2. *See* Order No. 2 at 14 (“Any contentions not set forth in detail as required herein shall be deemed abandoned or withdrawn”). Even if Andrea’s theory had been properly disclosed, it is incompatible with the claim language, which references the “frequency bins” and the “magnitude of the frequency bin[s]” as two separate quantities. *See* '345 patent claim 1, claim 38. Moreover, the magnitude of each frequency bin is used in the “threshold detector” limitation,

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- c. **“a threshold detector for setting a threshold for each frequency bin . . . and for detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold” (claim 1)/“setting a threshold for each frequency bin using a noise estimation process” and “detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold” (claim 38)**

Claims 1 and 38 require a means for or step of setting a threshold for each frequency bin and detecting whether the “magnitude” of a frequency bin is less than a corresponding threshold. ’345 patent at col. 9:41-47, col. 11: 16-18. Andrea relies on Mr. DeJaco’s analysis of Andrea’s source code as evidence that the DI products practice this limitation. CX-0007C at Q/A 1326-1343. There is no dispute from the other parties that these products practice this limitation.

### 2. Dependent Claims

There are no disputes between the parties regarding domestic industry for the limitations of the asserted dependent claims, but because none of the DI products satisfy the “frequency spectrum generator” limitation of claim 1 or claim 38, there is no DI product that practices any asserted claim of the ’345 patent.

### D. Economic Prong

The statute’s protections “apply only if an industry in the United States, relating to the articles protected by the patent . . . exists or is in the process of being established.” 19 U.S.C. §1337(a)(3) (emphasis added). As discussed with respect to the technical prong, Andrea has failed to demonstrate that it makes or ever has made a product that practices the claims of the ’345 patent. Nor does the record contain evidence that Andrea expends or has expended any

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which is separate from the “frequency spectrum generator” limitation. *Id.* The fact that similar threshold detectors are used in the ’345 patent and the ’637 patent only shows that the DI products practice the “threshold detector” limitation. Andrea must prove that the DI products practice each limitation of the claims, and it has not carried its burden to show the DI products generate the claimed frequency spectrum.

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sums on developing a product that practices the '345 patent. Andrea's evidence relates to the product that practices the '637 patent, which is not asserted in this investigation. In the absence of any expenditures relating to a domestic industry article that practices the frequency spectrum generator limitations of the '345 patent, Andrea fails to satisfy the economic prong.

### IX. REMEDY & BONDING

Andrea seeks a limited exclusion order ("LEO"). In the event that a violation is found, I recommend that an LEO should be issued. Andrea also seeks a cease and desist order "(CDO)" against Apple based on significant inventories in the U.S. of allegedly infringing products.

#### A. Public Interest and Remedy

If the Commission determines that there is a violation of section 337, it must also determine whether any proposed remedy would have an adverse effect on the public interest. In this investigation, the Commission has ordered that "the presiding administrative law judge shall take evidence or other information and hear arguments from the parties or other interested persons with respect to the public interest in this investigation, as appropriate, and provide the Commission with findings of fact and a recommended determination on this issue, which shall be limited to the statutory public interest factors set forth in 19 U.S.C. §§ 1337(d)(1), (f)(1), (g)(1). Notice of Investigation, 81 Fed. Reg. 73418-19 (Oct. 25, 2016) at 2. The statutory public interest factors are (1) the public health and welfare; (2) competitive conditions in the U.S. economy; (3) U.S. production of articles that are like or directly competitive with those that are the subject of the investigation; and (4) United States consumers. *Id.* at 1337(d)(1). There have been very few instances in the history of the Commission where the public interest factors were deemed to preclude implementation of the statutory penalties for violation. *See Spansion, Inc. v. Int'l Trade*



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*Comm'n*, 629 F.3d 1331, 1360 (Fed. Cir. 2010) (public interest discussion appropriately focused on “some important health or welfare need”).

Andrea says the public interest factors (“national security or life and death”) would not be affected by an LEO, and that Apple could easily design around or disable infringing components of its products within about three months. CIB at 139. Andrea maintains that its proposed remedy would have no adverse effect on the public interest because the evidence shows that Apple’s loyal customers would wait to purchase non-infringing Apple products during the period of any re-design. Other consumers could purchase products made by different manufacturers. Andrea maintains that the features of Apple products that relate to public health and welfare could be supplied by competitors and would remain available to existing users. Andrea argues that there is no evidence U.S. jobs would be lost if an LEO were issued.

Apple maintains that any remedy should be delayed to allow it to redesign its products and to permit the sale of existing products to avoid waste. Apple asserts that an LEO, if issued, should include exceptions for warranty, refurbishment and government use, and should include a certification provision. Apple points to the widespread applications and volume of sales of its devices and maintains that competitors’ products would not readily fit “the Apple ecosystem.” RIB at 144. Apple maintains that its products could not easily be replaced, even with other Apple products. In support of its arguments, Apple points to *Certain Microprocessors, Components Thereof, & Prods. Containing Same (“Microprocessors”)*, Inv. No. 337-TA-781, Initial Determination, 2012 WL 6883205 (Dec. 14, 2012).<sup>26</sup> Apple challenges the evidentiary basis for many of Andrea’s assertions concerning the likely effect of an exclusion order.<sup>27</sup>

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<sup>26</sup> Apple asserts that the ALJ in the 781 investigation found that an exclusion order against Apple’s desktop and laptop computers would significantly damage the public interest, negatively

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Apple asserts that any remedy should be tailored to lessen possible burdens on consumers. Specifically, Apple seeks time to implement an alternative to the accused software.

[REDACTED]

[REDACTED]

[REDACTED]. Apple says it would not save time to disable the accused algorithm rather than replacing it. Apple requests that any remedy permit the sale of existing products with a software update.

It is established that there is a massive market for Apple products in the United States and that exclusion of Apple products from the U.S. market, even for a relatively short time, would have a significant impact not only on Apple and its employees but on consumers, merchants, and institutions that rely on Apple products. *See* Tr. 409:8-11 (Apple sells approximately 15 million iPhones in a quarter); RX-0010C (Jaynes at Q/A 8-11) (Apple employs about 80,000 persons in the U.S., another 450,000 are employed by Apple's U.S.-based suppliers, and an estimated 1.5 million U.S. jobs are attributable to Apple's "ecosystem"); RX-1581. Given the widespread reliance on Apple products in the healthcare industry, the education industry, and the U.S. business community generally, *see* Tr. 422:19-423:12; RX-0006C (Vander Veen Q/A 16-25, 35-

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affect competitive conditions in the U.S. personal computer market, and adversely affect U.S. consumers. Apple omits mention of the fact that the ALJ concluded nevertheless that it was "not clear" whether the Commission should order exclusion of all the infringing products and recommended a delay in the entry of an exclusion order "by at least nine months." *Microprocessors*, 2012 WL 6883205 at \*173-174.

<sup>27</sup> Apple cites the *EPROMs* factors as support for its arguments, but the *EPROMs* factors do not apply in this factual setting. The *EPROMs* analysis sometimes is applied to determine whether products beyond those accused in an investigation should be excluded because they contain infringing articles. In this case, the patent itself does not cover any separate article of commerce, so any exclusion order must apply to Apple products that practice the patent. *See* SIB at 50 (citing *Certain Integrated Circuit Devices and Prods. Containing the Same*, Inv. No. 337-TA-873, Order No. 54 (Feb. 19, 2014)).

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36), it is not implausible that health and welfare services could be disrupted and adverse consequences for the public interest could ensue. While it is true that Apple's competitors might be able to step in to replace some excluded Apple products, *see* CX-0008C at Q/A 36; CX-1889C at Q/A 12; Tr. at 420:14-22, it also is true that the competitors' products might not fill the needs of consumers with investments in Apple's particular computing environment. *See* Tr. 288:11-289:16-18. In light of these facts, I recommend that any remedy, including an LEO, be delayed for a period of three months to one year to permit Apple to respond to the finding of infringement and implement an alternative. In addition, I recommend that any LEO include exceptions for warranty, refurbishment, and government use, as well as a certification provision.

I also find that Apple maintains significant inventory in the U.S., *see* JX-0024C, Appendix D, and I recommend that a CDO be issued to prevent Apple from selling infringing products. I agree with Apple that the CDO should permit the sale of products after the implementation of an appropriate software update that is downloaded upon first use by the consumer.

### **B. Bond**

The amount of a bond during the 60-day Presidential review period, if any, must be "sufficient to protect the complainant from any injury." 19 U.S.C. § 1337(j)(3). Andrea argues that a reasonable royalty rate for the '345 patent can be calculated based on its software license agreement with Samsung, in which the parties agreed to a [REDACTED] for the use of one of Andrea's software products. JX-0038C at 7; CX-0021C. Apple maintains that Andrea does not sell consumer electronics products that compete with Apple's products and would not lose sales during any Presidential review period, and therefore no bond should be imposed. Apple maintains that if a bond is imposed, it should reflect lower rates in other Andrea

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agreements licensing the '345 patent. Andrea questions whether these other agreements are appropriate comparators.

I agree with Staff that a reasonable rate is the [REDACTED] in the Samsung license agreement.

### X. CONCLUSIONS OF LAW

Based on the foregoing, and the record as a whole, it is my final initial determination that there is no violation of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, in the importation into the United States, the sale for importation, and/or the sale within the United States after importation of certain audio processing hardware, software, and products containing the same by reason of infringement of U.S. Patent No. 6,363,345 ("the '345 patent").

This determination is based on the following conclusions of law:

- a. The Commission has subject matter jurisdiction over this investigation, *in personam* jurisdiction over Apple, and *in rem* jurisdiction over the accused Apple audio processing hardware, software, and products containing same.
- b. There has been an importation into the United States, sale for importation, or sale within the United States after importation of the accused Apple audio processing hardware, software, and products containing same.
- c. Andrea does not have standing to assert the '345 patent without joining another party.
- d. The accused Apple products do not infringe claims 4-11, 13-16, 21, 23-25, 38-40, 43, and 46 of the '345 patent.
- e. Claims 1, 4-7, 9-11, 13, 14, 21, and 38 of the '345 patent are not invalid as anticipated.
- f. Claims 4-11, 13-17, 21, 23-25, 39, 40, 43, 46, and 47 of the '345 patent are not invalid as obvious.
- g. The '345 patent is not unenforceable due to inequitable conduct or equitable estoppel.
- h. A domestic industry has not been shown to exist in the United States as required by subsection (a)(2) of section 337.

I hereby certify the record in this investigation to the Commission with my final initial

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determination. Pursuant to Commission Rule 210.38, the record further comprises the Complaint and exhibits thereto filed with the Secretary, the *Markman* order, and the exhibits attached to the parties' summary determination motions and the responses thereto. 19 C.F.R. § 210.38(a).

Pursuant to Commission Rule 210.42(c), this initial determination shall become the determination of the Commission 45 days after the service thereof, unless a party files a petition for review pursuant to Commission Rule 210.43(a), the Commission orders its own review pursuant to Commission Rule 210.44, or the Commission changes the effective date of the initial determination. 19 C.F.R. § 210.42(h)(6).

Within ten (10) days of the date of this Initial Determination, each party shall submit to the Administrative Law Judge a statement as to whether or not it seeks to have any portion of this document deleted from the public version. *See* 19 C.F.R. § 210.5(f). A party seeking to have a portion of the order deleted from the public version thereof must attach to its submission a copy of the order with red brackets indicating the portion(s) asserted to contain confidential business information.<sup>28</sup> The parties' submissions under this subsection need not be filed with the

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<sup>28</sup> To avoid depriving the public of the basis for understanding the result and reasoning underlying the decision, redactions should be limited. Parties who submit excessive redactions may be required to provide an additional written statement, supported by declarations from individuals with personal knowledge, justifying each proposed redaction and specifically explaining why the information sought to be redacted meets the definition for confidential business information set forth in Commission Rule 201.6(a). 19 C.F.R. § 201.6(a).

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Commission Secretary but shall be submitted by paper copy to the Administrative Law Judge and by e-mail to the Administrative Law Judge's attorney advisor.

**SO ORDERED.**

*Dee Lord*

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Dee Lord  
Administrative Law Judge

**PUBLIC CERTIFICATE OF SERVICE**

I, Lisa R. Barton, hereby certify that the attached **INITIAL DETERMINATION** has been served by hand upon the Commission Investigative Attorney, Whitney Winston, Esq., and the following parties as indicated, on 12/6/2017



Lisa R. Barton, Secretary  
U.S. International Trade Commission  
500 E Street, SW, Room 112  
Washington, DC 20436

**On Behalf of Complainants Andrea Electronics Corp.:**

Goutam Patnaik, Esq.  
**PEPPER HAMILTON LLP**  
600 Fourteenth Street, N.W.  
Washington, DC 20005-2004

- Via Hand Delivery
- Via Express Delivery
- Via First Class Mail
- Other: \_\_\_\_\_

**On Behalf of Respondent Apple Inc.:**

Ching-Lee Fukuda  
**SIDLEY AUSTIN LLP**  
787 Seventh Avenue  
New York, NY 10019

- Via Hand Delivery
- Via Express Delivery
- Via First Class Mail
- Other: \_\_\_\_\_