FILED
October 10, 2022
CLERK, U.S. DISTRICT COURT
WESTERN DISTRICT OF TEXAS
BY: lad
DEPUTY

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

EIGHT KHZ, LLC, Plaintiff, v. **META PLATFORMS, INC.; META PLATFORMS TECHNOLOGIES, LLC; TWISTED PIXEL GAMES, LLC,** Defendants.	Civil Action No. 6:22-cv-575-ADA **AMENDED COMPLAINT FOR PATENT INFRINGEMENT** **JURY TRIAL DEMANDED**

AMENDED COMPLAINT FOR PATENT INFRINGEMENT AND DEMAND FOR JURY TRIAL

Plaintiff Eight kHz, LLC files this Complaint for Patent Infringement and Damages against Defendants Meta Platforms, Inc.; Meta Platforms Technologies, LLC; and Twisted Pixel Games, LLC (collectively "Defendants") and would respectfully show the Court as follows:

PARTIES

1. Plaintiff Eight kHz, LLC ("8KHZ" or "Plaintiff") is a Wyoming limited liability company with its principal place of business at 36 Shadow Brook Lane, Lander, Wyoming 82520. 8KHZ is an American firm that, through its owners, invents technology related to, among other things, enhancements to VR/AR platforms, spatial and 3D audio, and related solutions to enhance safety and functionality for consumer devices.

2. Defendant Meta Platforms, Inc. ("Meta Platforms") is a corporation organized under the laws of the State of Delaware with a principal place of business located at 1601 Willow Road, Menlo Park, CA 94025. Meta Platforms was formerly known as Facebook, Inc. Meta Platforms may be served with process by serving its registered agent, Corporation Service

Meta Platforms, Inc.
Exhibit 1122
Page 001

Company DBA CSC - Lawyers Incorporating Service Company at 211 E. 7th Street, Suite 620, Austin, Texas 78701-3218.

3. Defendant Meta Platforms Technologies, LLC ("Meta Technologies") is a limited liability company organized under the laws of the State of Delaware with a principal place of business at 1601 Willow Road, Menlo Park, CA 94025. Meta Technologies is a wholly-owned subsidiary of Meta Platforms. Meta Technologies was formerly known as Facebook Technologies, LLC. Meta Technologies may be served with process by serving its registered agent, Corporation Service Company DBA CSC - Lawyers Incorporating Service Company at 211 E. 7th Street, Suite 620, Austin, Texas 78701-3218.

4. Defendant Twisted Pixel Games, LLC ("Twisted Pixel") is a limited liability company organized under the laws of the State of Texas with a principal place of business at 3601 S. Congress Avenue, Suite B300, Austin, Texas 78704-7267. In or around November 2021 Twisted Pixel was acquired by Meta Platforms, Inc., and as of the filing of this Amended Complaint is fully and effectively controlled by Meta Platforms. Twisted Pixel may be served with process by serving its registered agent, Corporation Service Company DBA CSC – Lawyers Incorporating Service Company at 211 E. 7th Street, Suite 620, Austin, Texas 78701-3218.

5. On information and belief, Meta Platforms, Meta Technologies, and Twisted Pixel (collectively referred to as "Meta" or "Defendants") directly and/or indirectly develop, design, manufacture, distribute, market, offer to sell and/or sell infringing products and services in the United States, including in the Western District of Texas, and otherwise direct infringing activities to this District in connection with their products and services as set forth in this complaint. This includes but is not limited to Defendants offering "Oculus" virtual reality or augmented reality

devices that have "spatial audio" and "safe areas" functionality, and software applications which utilize "spatial audio" and "safe areas" functionality on said devices.

JURISDICTION

6. This civil action arises under the Patent Laws of the United States, 35 U.S.C. § 1 *et seq*., including without limitation 35 U.S.C. §§ 271, 281, 283, 284, and 285. This is a patent infringement lawsuit over which this Court has subject matter jurisdiction under, *inter alia*, 28 U.S.C. §§ 1331, 1332, and 1338(a).

7. This United States District Court for the Western District of Texas has general and specific personal jurisdiction over Defendants because, directly or through intermediaries, Defendants have committed acts within the District giving rise to this action and are present in and transact and conduct business in and with residents of this District and the State of Texas.

8. 8KHZ's causes of action arise, at least in part, from Defendants' contacts with and activities in this District and the State of Texas.

9. Defendants have committed acts of infringing the patents-in-suit (as defined in ¶ 87) within this District and the State of Texas by making, using, selling, offering for sale, and/or importing in or into this District and elsewhere in the State of Texas, products claimed by the patents-in-suit, including without limitation products made by practicing the claimed methods of the patents-in-suit. Defendants, directly and through intermediaries, make, use, sell, offer for sale, import, ship, distribute, advertise, promote, and/or otherwise commercialize such infringing products into this District and the State of Texas. Defendants regularly conduct and solicit business in, engage in other persistent courses of conduct in, and/or derive substantial revenue from goods and services provided to residents of this District and the State of Texas.

10. This Court has personal jurisdiction over Defendants pursuant to TEX. CIV. PRAC. & REM. CODE § 17.041 *et seq*.

11. Personal jurisdiction exists over Defendants because Defendants have minimum contacts with this forum as a result of business regularly conducted within the State of Texas and within this District, and, on information and belief, specifically as a result of, at least, committing the tort of patent infringement within Texas and this District.

12. This Court also has personal jurisdiction over Defendants, in part, because Defendants do continuous and systematic business in this District, including by providing infringing products and services to the residents of the Western District of Texas that Defendants knew would be used within this District, and by soliciting business from the residents of the Western District of Texas.

13. Defendants are further subject to personal jurisdiction in this Court because, *inter alia*, Defendants through agents regularly solicit and transact business in the Western District of Texas, and have an established place of business in the Western District of Texas. Accordingly, this Court's jurisdiction over the Defendants comports with the constitutional standards of fair play and substantial justice and arises directly from the Defendants' purposeful minimum contacts with the State of Texas.

14. This Court also has personal jurisdiction over Defendants, because Defendants have made its products available within this District.

15. Venue is proper in this Court under 28 U.S.C. §§ 1391 and 1400(b).

16. For example, Meta currently maintains or has maintained a presence at 607 West Third Street, Austin, Texas 78701; at 300 West 6th Street, Austin, Texas 78701; at 11601 Alterra Parkway, Austin, Texas 78758; and at 13011 McCallen Pass, Austin, Texas 78753.

17. For example, Twisted Pixel currently maintains or has maintained a presence at 3601 South Congress Avenue, Suite B300, Austin, Texas 78704-7267.

18. On information and belief, Twisted Pixel's managing members include Charles J. Bear Frank L. Wilson and William N. Muehl, who each reside in Austin, Texas.

19. On information and belief, Defendants maintain at least a 256,000 square foot office space in this District.

20. On information and belief, Defendants employ more than 2,000 people in this District in more than 100 of its teams.

21. On information and belief, Defendants' employees work in this District in at least the following teams: AR/VR, Advertising Technology, Business Development & Partnerships, Communications & Public Policy, Software Engineering, Legal, Enterprise Engineering, People & Recruiting, Design & User Experience, Infrastructure, Data & Analytics, Sales & Marketing, and Twisted Pixel. Defendants' employees in those divisions work, at least in part, on Oculus products or in subject matters related to the Oculus products that are relevant to the claims or defenses in this action.

22. As recently as January 2022, Defendants announced an intention to specifically expand its operations in this District. On information and belief, this expansion specifically includes its virtual reality and augmented reality staff.

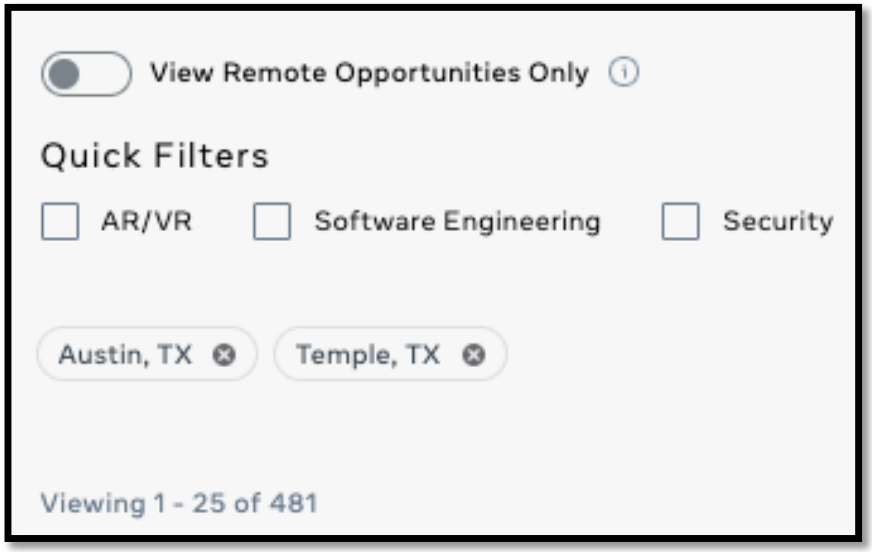
23. On information and belief, on December 31, 2021 Meta signed a lease for 589,000 square feet across 33 floors (the entire commercial half) of Austin's tallest building, constituting the largest-ever lease in Downtown Austin.[1]

[1] See https://www.kvue.com/article/money/economy/boomtown-2040/meta-facebook-largest-austin-tower-lease/269-f9284374-d11e-479d-9c15-a83a96db2f67 (last visited June 3, 2022).

24. Meta is also in the process of building in this District a $800 million data center in Temple, Texas reported to total 900,000 square feet and employ 100 people.[2] The data center construction is estimated to employ 1,250 local construction workers at the peak of construction.[3]

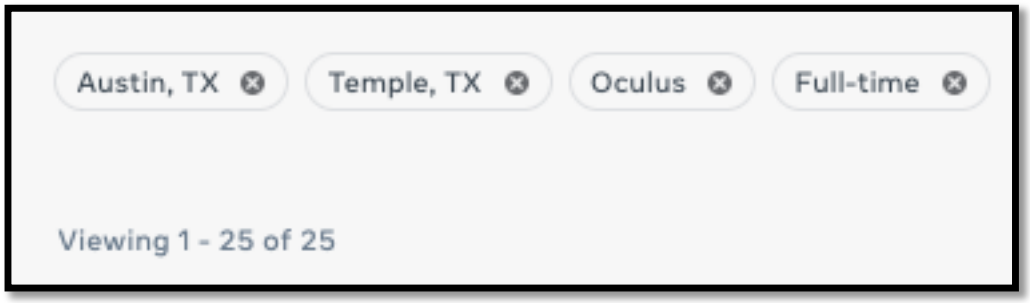
25. On information and belief, several Meta personnel, including without limitation Meta employees, located in this District are key fact witnesses in this litigation, such that 8KHZ intends to call them to testify at trial.

26. Despite declaring a hiring freeze for certain verticals,[4] the Careers section of Meta's website as of the date of this Complaint shows a total of 481 jobs available in this District in either Austin or Temple:[5]



[2] See https://www.statesman.com/story/business/2022/04/05/meta-facebook-parent-company-building-800-million-texas-data-center-create-jobs/9462964002/ (last visited June 3, 2022).
[3] *Id*.
[4] See https://www.theverge.com/2022/5/18/23125571/meta-hiring-freeze-commerce-messenger-kids-facebook-gaming (last visited June 3, 2022).
[5] See https://www.metacareers.com/jobs/?offices[0]=Austin%2C%20TX&offices[1]=Temple%2C%20TX (last visited June 3, 2022).

Of these 481 jobs advertised as of the date of this Complaint as being available in this District, at least 25 are full-time positions dedicated to Meta's Oculus brand:[6]

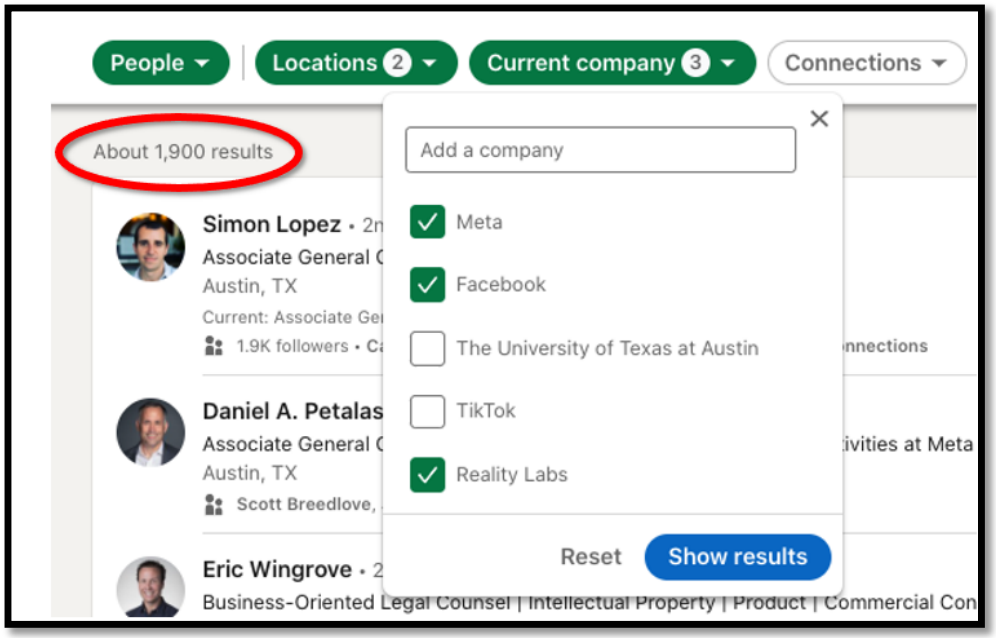


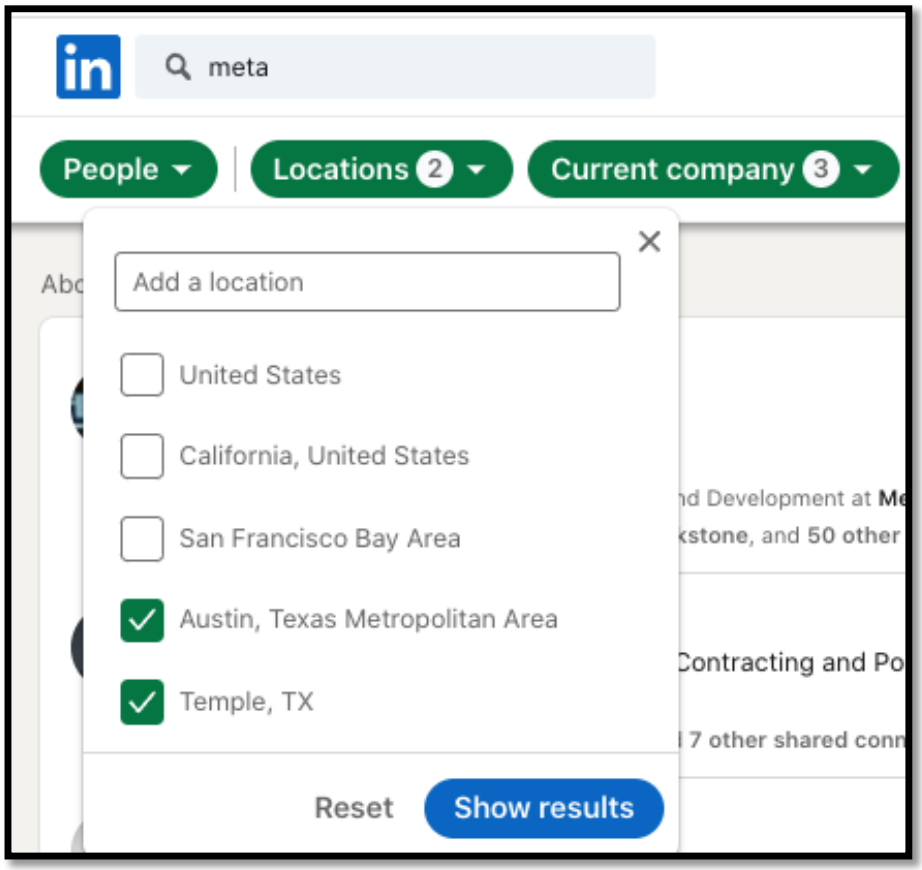
27. A search on LinkedIn indicates that at least "about 1900" people represent that they are currently employed by Meta, Facebook, or Reality Labs[7] as of the date of this Complaint:[8]

[6] See https://www.metacareers.com/jobs/?offices[0]=Austin%2C%20TX&offices[1]=Temple%2C%20TX&divisions[0]=Oculus&roles[0]=full-time (last visited June 3, 2022).

[7] Reality Labs is a business of Meta Platforms (formerly Facebook Inc.) that produces virtual reality (VR) and augmented reality (AR) hardware and software, including virtual reality headsets such as Quest, and metaverse platforms such as Horizon Worlds. Reality Labs is the corporate successor to Oculus.

[8] See https://www.linkedin.com/search/results/people/?currentCompany=%5B%222349934%22%2C%2210667%22%2C%2276987811%22%5D&geoUrn=%5B%2290000064%22%2C%22103364699%22%5D&keywords=meta&origin=GLOBAL_SEARCH_HEADER&sid=w.0 (last visited June 3, 2022).


People
Locations 2
Current company 3
Connections
About 1,900 results
Add a company
Meta
Facebook
The University of Texas at Austin
TikTok
Reality Labs
Reset
Show results
Simon Lopez
Associate General
Austin, TX
Daniel A. Petalas
Associate General
Austin, TX
Eric Wingrove
Business-Oriented Legal Counsel | Intellectual Property | Product | Commercial Con


in
meta
People
Locations 2
Current company 3
Add a location
United States
California, United States
San Francisco Bay Area
Austin, Texas Metropolitan Area
Temple, TX
Reset
Show results

28. For example and without limitation, on information and belief, Tim Loving, Head of Research VR (virtual reality), works in Meta's offices in this District.[9]

29. For example and without limitation, on information and belief, Salvael Ortega, Meta's Partnerships Manager, AR Glasses @ Reality Labs (formerly AR/VR) who works "with executives, product managers, engineers, researchers, and all other functions across Meta's Reality Labs (formerly Facebook, AR/VR, Oculus) to define and execute [Meta's] Augmented Reality product roadmap, and establish the critical partnerships needed to realize that future" is located in Austin in this District.[10]

30. For example and without limitation, Jonathan Atkins, the Director, Head of Design for Virtual Reality at Meta, works in Meta's offices in this District; Mr. Atkins is the Director of Design for systems that are specifically accused in this Complaint.[11]

31. On information and belief, all employees and members of Twisted Pixel are based in the Austin area in this District.

32. For example and without limitation, the above-named individuals work, at least in part, on Oculus products or virtual reality or augmented reality products in this District, such that 8KHZ intends to call them to testify at trial.

33. For example and without limitation, all individuals described above, whether named or unnamed, work on, at least in part, spatial audio and safe-area functionality that relates to the subject matter of the patents-in-suit.

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[9] See https://www.linkedin.com/in/timloving/ (last visited June 3, 2022)
[10] See https://www.linkedin.com/in/salvael/ (last visited June 3, 2022)
[11] See https://www.linkedin.com/in/jonathanatkins27/ (last visited June 3, 2022)

34. For example and without limitation, Ana Boza, Meta's Lead Intellectual Property Counsel, works in Meta's offices in this District.[12]

35. For example and without limitation, Michelle Chuang, Associate General Counsel for Meta's Reality Labs works in Meta's offices in this District.[13]

36. For example and without limitation, Scott Eisen, Meta's Associate General Counsel for Intellectual Property and Content at Meta, works in Meta's offices in this District.[14]

37. For example and without limitation, Meta, at the time of this Amended Complaint, has a job listing for a Senior Producer with experience in "VR or AR product[s]" to join the Twisted Pixel team in Austin, Texas.[15]

38. On information and belief, the above-named individuals, including without limitation Ms. Boza and Mr. Eisen, are strategic leaders of the IP team at Meta who communicated with Plaintiff regarding licensing and inspection of the Plaintiff's entire patent portfolio. 8KHZ plans to call these witnesses at trial to prove that Defendants have knowingly and willfully infringed the patents-in-suit and continue to do so.

39. On information and belief, there are additional key witnesses who work on Oculus products or virtual reality or augmented reality products in this District and 8KHZ plans to have these people available at trial.

40. On information and belief, the full Oculus code includes millions of files edited over the relevant time period by thousands of employees, many of whom edited such code while located in this District and are currently located in this District.

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[12] See https://www.linkedin.com/in/anaboza/ (last visited June 3, 2022)
[13] See https://www.linkedin.com/in/michellechuangjd/ (last visited June 3, 2022)
[14] See https://www.linkedin.com/in/scotteisen1/ (last visited June 3, 2022)
[15] See https://www.metacareers.com/v2/jobs/1533049130405169/ (last visited September 23, 2022)

41. On information and belief, there are key witnesses who work in other divisions of Meta Platforms, Meta Technologies, or Twisted Pixel, including those who perform finance and marketing functions related to Oculus that are located in this District, and will be called as witnesses at trial for, among other things, the purposes of quantifying and substantiating damages in this case.

42. On information and belief, there are key witnesses in this District who have first-hand knowledge regarding the Accused Products (as that term is defined herein at ¶ 84), including without limitation the Facebook-Oculus acquisition and the valuation of the virtual reality intellectual property acquired in connection with that acquisition.

43. On information and belief, there are key non-party witnesses, including without limitation former Meta employees, located in this District who have factual first-hand knowledge regarding the Accused Products and other facts important for this litigation.

44. On information and belief, the full Oculus code is maintained and available in this District.

45. On information and belief, the majority of documents relevant to this litigation are accessible by Defendants through its offices in this District.

46. On information and belief, Meta maintains a data center in this District.

47. On information and belief, this data center hosts, among other things, information related to the Meta Quest Application Store, a service whereby the Defendants offer for sale, solicit to sell, and sell infringing applications and software to users of the Accused Products, including the Horizon Workroom application set forth in this complaint and exhibits.

48. According to Lex Machina, since September 6, 2018,[16] the median time to trial in patent cases in the Waco Division of the Western District of Texas has been 656 days (1.8 years), which is significantly faster than alternative venues.

49. Meta, doing business under the name Facebook, Inc., has not contested proper venue in this District for patent infringement actions in the past. *See* Order Denying Motion to Transfer at 2*, USC IP Partnership, L.P. v. Facebook, Inc.,* No. 6-20-CV-00555-ADA, ECF No. 45 (W.D. Tex. Mar. 8, 2021) ("Neither Facebook nor USC contests that venue is proper in the Western District of Texas[.]").

THE PATENTS-IN-SUIT

50. Hereinafter, Meta Platforms, Inc. and Meta Platforms Technologies, LLC will be collectively referred to as the "Meta Defendants."

51. On March 8, 2016, United States Patent No. 9,282,196 B1 ("the '196 patent"), entitled "MOVING A SOUND LOCALIZATION POINT OF A COMPUTER PROGRAM DURING A VOICE EXCHANGE." was duly and legally issued by the United States Patent and Trademark Office ("USPTO") to Glen Norris and Philip Lyren. A true and correct copy of the '196 patent is attached hereto as **Exhibit A**.

52. The '196 patent claims patent-eligible subject matter and is valid and enforceable.

53. 8KHZ is the exclusive owner by assignment of all rights, title, and interest in the '196 patent, including the right to bring this suit for injunctive relief and damages, and including the right to sue and recover all past, present, and future damages for infringement of the '196 patent.

[16] This is the date on which Judge Albright was sworn in as a Federal District Court judge.

54. The Meta Defendants do not have a license to the '196 patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '196 patent whatsoever.

55. On June 6, 2017, United States Patent No. 9,674,628 B1 ("the '628 patent"), entitled "PROVIDING BINAURAL SOUND TO LOCALIZE AT AN IMAGE DURING A TELEPHONE CALL" was duly and legally issued by the USPTO to Glen Norris and Philip Lyren. A true and correct copy of the '628 patent is attached hereto as **Exhibit B**.

56. The '628 patent claims patent-eligible subject matter and is valid and enforceable.

57. 8KHZ is the exclusive owner by assignment of all rights, title, and interest in the '628 patent, including the right to bring this suit for injunctive relief and damages, and including the right to sue and recover all past, present, and future damages for infringement of the '628 patent.

58. The Meta Defendants do not have a license to the '628 patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '628 patent whatsoever.

59. On October 15, 2019, United States Patent No. 10,448,184 ("the '184 patent"), entitled "SWITCHING BINAURAL SOUND" was duly and legally issued by the USPTO to Glen Norris and Philip Lyren. A true and correct copy of the '184 patent is attached hereto as **Exhibit C**.

60. The '184 patent claims patent-eligible subject matter and is valid and enforceable.

61. 8KHZ is the exclusive owner by assignment of all rights, title, and interest in the '184 patent, including the right to bring this suit for injunctive relief and damages, and including the right to sue and recover all past, present, and future damages for infringement of the '184 patent.

62. Defendants do not have a license to the '184 patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '184 patent whatsoever.

63. On February 9, 2021, United States Patent No. 10,917,737 B2 ("the '737 patent"), entitled "DEFINING A ZONE WITH A HPED AND PROVIDING SOUND IN THE ZONE" was duly and legally issued by the USPTO to assignee C Matter Limited. A true and correct copy of the '737 patent is attached hereto as **Exhibit D**.

64. The '737 patent claims patent-eligible subject matter and is valid and enforceable.

65. 8KHZ is the exclusive owner by assignment of all rights, title, and interest in the '737 patent, including the right to bring this suit for injunctive relief and damages, and including the right to sue and recover all past, present, and future damages for infringement of the '737 patent.

66. The Meta Defendants do not have a license to the '737 patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '737 patent whatsoever.

67. On December 29, 2015, United States Patent No. 9,226,090 B1 ("the '090 patent"), entitled SOUND LOCALIZATION FOR AN ELECTRONIC CALL was duly and legally issued by the USPTO to Glen Norris and Philip Lyren. A true and correct copy of the '090 patent is attached hereto as **Exhibit E**.

68. The '090 patent claims patent-eligible subject matter and is valid and enforceable.

69. 8KHZ is the exclusive owner by assignment of all rights, title, and interest in the '090 patent, including the right to bring this suit for injunctive relief and damages, and including the right to sue and recover all past, present, and future damages for infringement of the '090 patent.

70. The Meta Defendants do not have a license to the '090 patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '090 patent whatsoever.

71. On July 30, 2019, United States Patent No. 10,368,179 B1 ("the '179 patent"), entitled "SWITCHING BINAURAL SOUND" was duly and legally issued by the USPTO to Glen Norris and Philip Lyren. A true and correct copy of the '179 patent is attached hereto as **Exhibit F**.

72. The '179 patent claims patent-eligible subject matter and is valid and enforceable.

73. 8KHZ is the exclusive owner by assignment of all rights, title, and interest in the '179 patent, including the right to bring this suit for injunctive relief and damages, and including the right to sue and recover all past, present, and future damages for infringement of the '179 patent.

74. Defendants do not have a license to the '179 patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '179 patent whatsoever.

75. On October 6, 2020, United States Patent No. 10,798,509 B1 ("the '509 patent"), entitled "WEARABLE ELECTRONIC DEVICE DISPLAYS A 3D ZONE FROM WHERE BINAURAL SOUND EMANATES" was duly and legally issued by the USPTO to Glen Norris and Philip Lyren. A true and correct copy of the '509 patent is attached hereto as **Exhibit G**.

76. The '509 patent claims patent-eligible subject matter and is valid and enforceable.

77. 8KHZ is the exclusive owner by assignment of all rights, title, and interest in the '509 patent, including the right to bring this suit for injunctive relief and damages, and including the right to sue and recover all past, present, and future damages for infringement of the '509 patent.

78. The Meta Defendants do not have a license to the '509 patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '509 patent whatsoever.

79. On November 9, 2021, United States Patent No. 11,172,316 ("the '316 patent"), entitled "WEARABLE ELECTRONIC DEVICE DISPLAYS A 3D ZONE FROM WHERE BINAURAL SOUND EMANATES" was duly and legally issued by the USPTO to Glen Norris and Philip Lyren. A true and correct copy of the '316 patent is attached hereto as **Exhibit H**.

80. The '316 patent claims patent-eligible subject matter and is valid and enforceable.

81. 8KHZ is the exclusive owner by assignment of all rights, title, and interest in the '316 patent, including the right to bring this suit for injunctive relief and damages, and including the right to sue and recover all past, present, and future damages for infringement of the '316 patent.

82. The Meta Defendants do not have a license to the '316 patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '316 patent whatsoever.

83. On March 24, 2020, United States Patent No. 11,290,836 B2 ("the '836 patent"), entitled "PROVIDING BINAURAL SOUND BEHIND AN IMAGE BEING DISPLAYED WITH AN ELECTRONIC DEVICE was duly and legally issued by the USPTO to Glen Norris and Philip Lyren. A true and correct copy of the '836 patent is attached hereto as **Exhibit I**.

84. The '836 patent claims patent-eligible subject matter and is valid and enforceable.

85. 8KHZ is the exclusive owner by assignment of all rights, title, and interest in the '836 patent, including the right to bring this suit for injunctive relief and damages, and including the right to sue and recover all past, present, and future damages for infringement of the '836 patent.

86. The Meta Defendants do not have a license to the '836 patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '836 patent whatsoever.

87. The '196, '628, '184, '737, '090, '179, '509, '316, and '836 patents are collectively referred to herein as the "8KHZ Patents" or the "patents-in-suit."

88. Plaintiff has fulfilled its obligations, if any, under 35 U.S.C. § 287.

ACCUSED INSTRUMENTALITIES

89. Defendants manufacture, use, test, market, offer for sale, sell and/or import into the United States virtual reality or augmented reality headsets or other devices through its Oculus division, Reality Labs Division, and/or other divisions.

90. Hereafter, the term "Accused Instrumentalities" or "Accused Products" refers to all products manufactured, used, tested, imported, or sold by or on behalf of Defendants practicing the patents-in-suit and all processes employed by Defendants that practice the patents-in-suit, consisting of at least Defendants' products that support Oculus, including, by way of example and without limitation the Oculus Quest product lines.

91. On information and belief, such Accused Products include without limitation the following: Oculus Go, Oculus Rift S, Oculus Quest, Oculus Quest 2, and the applications created by Twisted Pixel including the "Path of the Warrior." To the extent Defendants have substituted the name "Meta" or "Reality Labs" for "Oculus" in any of the above products, such products are also included in the Accused Products.

92. The Accused Products have, among other things, "spatial audio" and "safe area" functionality (the safe-area functionality is referred to by the Defendants as the "Guardian" functionality) that infringe the patents-in-suit.

93. On information and belief, the Meta Defendants also have in development a virtual reality device internally known as "Cambria," "Quest 3," and "Oculus Pro." On May 12, 2022, Co-Founder, Chairman, and CEO of founder, chairman and CEO of Meta, Mark Zuckerberg, posted a public video on the Facebook social media platform partially unveiling "Project Cambria" and demonstrating selective features of the upcoming device.

94. The May 12, 2022 video featuring Mark Zuckerberg is publicly available at the following address: https://www.facebook.com/zuck/videos/316791413790661 (last visited June 3, 2022).

95. On information and belief, the "Cambria" device possesses, at the very least, capabilities identical to the existing Quest 2 product including spatial audio functionality and the Guardian safety system.

96. On information and belief, the Meta Defendants have made and/or used the "Cambria" device internally in a manner which infringes each of the patents-in-suit. As such, the "Cambria" device in its current form as well as the form in which it is released to the public is also specifically included in the Accused Products.

ALLEGATIONS RELATED TO INDIRECT INFRINGEMENT

97. Defendants have knowingly (since at least the date of this Complaint) and intentionally actively aided, abetted and induced others to directly infringe at least one of the patents-in-suit (such as its customers in this District and throughout the United States).

98. Included in the retail packaging of each of the Accused Products are product manuals written by Meta. These product manuals outline how to enable each of the infringing features, including the Guardian system.

99. Meta also produces instructional videos regarding the Accused Products which set forth how end users may implement, enable, and use the infringing features of the Accused Products. These videos appear on the Facebook and YouTube platforms.

100. For instance, and by of way example, "Meta Quest," a YouTube channel run by the Meta Defendants, published a video entitled "Oculus Quest Basics Tutorial" on May 20, 2019. That video is publicly available at https://www.youtube.com/watch?v=pVFcsedWsKE (last visited October 7, 2022).

101. The Oculus Quest Basic Tutorial video instructs new end users of the Oculus Quest device how to initially set up the Oculus Quest device, and how to utilize the "Guardian System."

102. Additional videos produced by "Meta Quest," and are publicly disseminated on YouTube and other public internet video platforms, which show that the Meta Defendants induced and continue to induce infringement via end users, are contained within the exhibits attached to this petition, outlining how the Accused Products infringe each of the patents-in-suit.

103. Meta also engages in significant efforts to disseminate advertising and public information regarding the Accused Products which also induce infringement by third parties including end users.

104. For instance, on or about Aug 19, 2021, Mark Zuckerberg appeared on the national broadcast television show CBS This Morning with Gayle King to demonstrate the Accused Products.

105. Specifically, Zuckerberg appeared on CBS This Morning broadcast to demonstrate Horizon Workrooms to the public on an Oculus Quest 2 device.

106. In this broadcast, Zuckerberg specifically stated that "spatial audio" was a key technology to the success and viability of the Horizon Workrooms application.

107. In this broadcast, Zuckerberg guided Ms. King on how to utilize the Oculus Quest 2 device in a manner which infringes the several of the patents-in-suit.

108. This broadcast was disseminated nationally on daytime television, and continues to be disseminated via YouTube. This video is publicly available at: https://www.youtube.com/watch?v=frZQrEBVkkk (last visited June 3, 2022).

FACTUAL ALLEGATIONS RELATED TO WILLFULNESS

109. The Meta Defendants have knowingly (since at least the date of this Complaint) and intentionally actively aided, abetted, and induced others to directly infringe at least one claim of the '196 patent (such as its customers in this District and throughout the United States).

110. In or around January 2020, Plaintiff sent a sampling of its patent portfolio to the Meta Defendants for consideration of purchase of the portfolio.

111. The Meta Defendants expressed interest in potentially purchasing an intellectual property portfolio that included the patents-in-suit, but requested that Plaintiff send the entirety of its patent portfolio to them regarding virtual reality.

112. Plaintiff sent the Meta Defendants a list of the patents in its patent portfolio to Defendants for consideration, including the then-issued patents-in-suit.

113. The Meta Defendants did not continue communications with Plaintiff after receiving the portfolio.

114. The Meta Defendants did not purchase or license any of Plaintiff's patents.

115. On information and belief, the Meta Defendants, with direct knowledge and possession of Plaintiff's entire patent portfolio, which includes the patents related to virtual and augmented reality, did willfully infringe the patents-in-suit.

COUNT I
PATENT INFRINGEMENT OF THE '196 PATENT

116. Plaintiff restates and realleges the preceding paragraphs of this Complaint.

117. The Meta Defendants have, under 35 U.S.C. § 271(a), directly infringed, and continue to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including without limitation at least claim 15 of the '196 patent, by making, using, testing, selling, offering for sale and/or importing into the United States Defendants' Accused Products.

118. The Meta Defendants also indirectly infringe the '196 patent by actively inducing the direct infringement by third parties under 35 U.S.C. § 271(b).

119. The Meta Defendants have knowingly (since at least the date of this Complaint) and intentionally actively aided, abetted and induced others to directly infringe at least one claim of the '196 patent (such as its customers in this District and throughout the United States).

120. The Meta Defendants continue to induce infringement of the '196 patent.

121. The Meta Defendants have contributorily infringed and are contributory infringers because, with knowledge of the '196 patent (since at least the date of this Complaint), they supply a material part of a claimed combination, where the material part is not a staple article of commerce, and is incapable of substantial noninfringing use.

122. The Meta Defendants contribute to their customers' infringement because, with knowledge of the '196 patent, the Meta Defendants supply the technology that allows their customers to infringe the '196 patent.

123. The Meta Defendants have knowledge that their activities concerning the Accused Products infringe one or more claims of the '196 patent.

124. The Meta Defendants' customers, such as consumers or end users, have actually infringed claims of the '196 patent by using the Accused Products in a manner proscribed by the Meta Defendants, and as such, the Meta Defendants' customers are direct infringers.

125. On information and belief, the Meta Defendants will continue to encourage, aid, or otherwise cause third parties to import, sell, offer for sale, and use the Accused Products (which are acts of direct infringement of the '196 patent) and the Meta Defendants have and will continue to encourage those acts with the specific intent to infringe one or more claims of the '196 patent.

126. Further, the Meta Defendants provide information and technical support to their customers, including promotional materials, product manuals, brochures, videos, demonstrations, and website materials encouraging its customers to purchase and instructing them to use the Meta Defendants' Accused Products (which are acts of direct infringement of the '196 patent).

127. Alternatively, the Meta Defendants know and/or will know that there is a high probability that the importation, sale, offer for sale, and use of the Accused Products constitutes direct infringement of the '196 patent but took deliberate actions to avoid learning of these facts.

128. On information and belief, the Meta Defendants' infringement of the '196 patent has been willful and merits increased damages.

129. On information and belief, the Meta Defendants have known that their activities concerning the Accused Products infringed one or more claims of the '196 patent since at least the date of this Complaint.

130. On information and belief, the Meta Defendants have made no attempt to design around the claims of the '196 patent.

131. On information and belief, the Meta Defendants did not have a reasonable basis for believing that the claims of the '196 patent were invalid.

132. On information and belief, the Meta Defendants' Accused Products are available to businesses and individuals throughout the United States and in the State of Texas, including in this District.

133. 8KHZ has been damaged as the result of the Meta Defendants' willful infringement. Upon information and belief, the Meta Defendants will continue to infringe one or more claims of the '196 patent unless and until they are enjoined by this Court.

134. The Meta Defendants have caused and will continue to cause 8KHZ irreparable injury and damage by infringing one or more claims of the '196 patent. 8KHZ will suffer further irreparable injury, for which it has no adequate remedy at law, unless and until the Meta Defendants are enjoined from infringing the claims of the '196 patent.

135. The claim chart attached hereto as **Exhibit J** describes how the elements of an exemplary claim 15 from the '196 patent are infringed by the Accused Products. This provides details regarding only one example of the Meta Defendants' infringement, and only as to a single patent claim, and Plaintiff reserves its right to provide greater detail and scope via its Infringement Contentions at the time required under this Court's scheduling order and local rules.

COUNT II
PATENT INFRINGEMENT OF THE '628 PATENT

136. Plaintiff restates and realleges the preceding paragraphs of this Complaint.

137. The Meta Defendants have, under 35 U.S.C. § 271(a), directly infringed, and continue to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including without limitation at least claim 16 of the '628 patent, by making, using, testing, selling, offering for sale and/or importing into the United States Defendants' Accused Products.

138. The Meta Defendants also indirectly infringe the '628 patent by actively inducing the direct infringement by third parties under 35 U.S.C. § 271(b).

139. The Meta Defendants have knowingly (since at least the date of this Complaint) and intentionally actively aided, abetted and induced others to directly infringe at least one claim of the '628 patent (such as its customers in this District and throughout the United States).

140. The Meta Defendants continue to induce infringement of the '628 patent.

141. The Meta Defendants have contributorily infringed and are contributory infringers because, with knowledge of the '628 patent (since at least the date of this Complaint), they supply a material part of a claimed combination, where the material part is not a staple article of commerce, and is incapable of substantial noninfringing use.

142. The Meta Defendants contribute to their customers' infringement because, with knowledge of the '628 patent, the Meta Defendants supply the technology that allows their customers to infringe the '628 patent.

143. The Meta Defendants have knowledge that their activities concerning the Accused Products infringe one or more claims of the '628 patent.

144. The Meta Defendants' customers, such as consumers or end users, have actually infringed claims of the '628 patent by using the Accused Products in a manner proscribed by the Meta Defendants, and as such, the Meta Defendants' customers are direct infringers.

145. On information and belief, the Meta Defendants will continue to encourage, aid, or otherwise cause third parties to import, sell, offer for sale, and use the Accused Products (which are acts of direct infringement of the '628 patent) and the Meta Defendants have and will continue to encourage those acts with the specific intent to infringe one or more claims of the '628 patent.

146. Further, the Meta Defendants provide information and technical support to their customers, including promotional materials, product manuals, brochures, videos, demonstrations, and website materials encouraging its customers to purchase and instructing them to use the Meta Defendants' Accused Products (which are acts of direct infringement of the '628 patent).

147. Alternatively, the Meta Defendants know and/or will know that there is a high probability that the importation, sale, offer for sale, and use of the Accused Products constitutes direct infringement of the '628 patent but took deliberate actions to avoid learning of these facts.

148. On information and belief, the Meta Defendants' infringement of the '628 patent has been willful and merits increased damages.

149. On information and belief, the Meta Defendants have known that their activities concerning the Accused Products infringed one or more claims of the '628 patent since at least the date of this Complaint.

150. On information and belief, the Meta Defendants have made no attempt to design around the claims of the '628 patent.

151. On information and belief, the Meta Defendants did not have a reasonable basis for believing that the claims of the '628 patent were invalid.

152. On information and belief, the Meta Defendants' Accused Products are available to businesses and individuals throughout the United States and in the State of Texas, including in this District.

153. 8KHZ has been damaged as the result of the Meta Defendants' willful infringement. Upon information and belief, the Meta Defendants will continue to infringe one or more claims of the '628 patent unless and until they are enjoined by this Court.

154. The Meta Defendants have caused and will continue to cause 8KHZ irreparable injury and damage by infringing one or more claims of the '628 patent. 8KHZ will suffer further irreparable injury, for which it has no adequate remedy at law, unless and until the Meta Defendants are enjoined from infringing the claims of the '628 patent.

155. The claim chart attached hereto as **Exhibit K** describes how the elements of an exemplary claim 16 from the '628 patent are infringed by the Accused Products. This provides details regarding only one example of the Meta Defendants' infringement, and only as to a single patent claim, and Plaintiff reserves its right to provide greater detail and scope via its Infringement Contentions at the time required under this Court's scheduling order.

COUNT III
PATENT INFRINGEMENT OF THE '184 PATENT

156. Plaintiff restates and realleges the preceding paragraphs of this Complaint.

157. Defendants have, under 35 U.S.C. § 271(a), directly infringed, and continue to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including without limitation at least claim 14 of the '184 patent, by making, using, testing, selling, offering for sale and/or importing into the United States Defendants' Accused Products.

158. Defendants also indirectly infringe the '184 patent by actively inducing the direct infringement by third parties under 35 U.S.C. § 271(b).

159. Defendants have knowingly (since at least the date of this Complaint) and intentionally actively aided, abetted and induced others to directly infringe at least one claim of the '184 patent (such as its customers in this District and throughout the United States).

160. Defendants continue to induce infringement of the '184 patent.

161. Defendants have contributorily infringed and are contributory infringers because, with knowledge of the '184 patent (since at least the date of this Complaint), they supply a material part of a claimed combination, where the material part is not a staple article of commerce, and is incapable of substantial noninfringing use.

162. Defendants contribute to their customers' infringement because, with knowledge of the '184 patent, Defendants supply the technology that allows their customers to infringe the '184 patent.

163. Defendants have knowledge that their activities concerning the Accused Products infringe one or more claims of the '184 patent.

164. Defendants' customers, such as consumers or end users, have actually infringed claims of the '184 patent by using the Accused Products in a manner proscribed by Defendants, and as such, Defendants' customers are direct infringers.

165. On information and belief, Defendants will continue to encourage, aid, or otherwise cause third parties to import, sell, offer for sale, and use the Accused Products (which are acts of direct infringement of the '184 patent) and Defendants have and will continue to encourage those acts with the specific intent to infringe one or more claims of the '184 patent.

166. Further, Defendants provide information and technical support to their customers, including product manuals, brochures, videos, demonstrations, and website materials encouraging its customers to purchase and instructing them to use Defendants' Accused Products (which are acts of direct infringement of the '184 patent).

167. Alternatively, Defendants know and/or will know that there is a high probability that the importation, sale, offer for sale, and use of the Accused Products constitutes direct infringement of the '184 patent but took deliberate actions to avoid learning of these facts.

168. On information and belief, Defendants' infringement of the '184 patent has been willful and merits increased damages.

169. On information and belief, Defendants have known that their activities concerning the Accused Products infringed one or more claims of the '184 patent since at least the date of this Complaint.

170. On information and belief, Defendants have made no attempt to design around the claims of the '184 patent.

171. On information and belief, Defendants did not have a reasonable basis for believing that the claims of the '184 patent were invalid.

172. On information and belief, Defendants' Accused Products are available to businesses and individuals throughout the United States and in the State of Texas, including in this District.

173. 8KHZ has been damaged as the result of Defendants' willful infringement. Upon information and belief, Defendants will continue to infringe one or more claims of the '184 patent unless and until they are enjoined by this Court.

174. Defendants have caused and will continue to cause 8KHZ irreparable injury and damage by infringing one or more claims of the '184 patent. 8KHZ will suffer further irreparable injury, for which it has no adequate remedy at law, unless and until Defendants are enjoined from infringing the claims of the '184 patent.

175. The claim charts attached hereto as **Exhibit L** and **Exhibit L-1** describes how the elements of an exemplary claim 14 from the '184 patent are infringed by the Accused Products. This provides details regarding only one example of Defendants' infringement, and only as to a single patent claim, and Plaintiff reserves its right to provide greater detail and scope via its Infringement Contentions at the time required under this Court's scheduling order.

COUNT IV
PATENT INFRINGEMENT OF THE '737 PATENT

176. Plaintiff restates and realleges the preceding paragraphs of this Complaint.

177. The Meta Defendants have, under 35 U.S.C. § 271(a), directly infringed, and continue to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including without limitation at least claim 14 of the '737 patent, by making, using, testing, selling, offering for sale and/or importing into the United States Defendants' Accused Products.

178. The Meta Defendants also indirectly infringe the '737 patent by actively inducing the direct infringement by third parties under 35 U.S.C. § 271(b).

179. The Meta Defendants have knowingly (since at least the date of this Complaint) and intentionally actively aided, abetted and induced others to directly infringe at least one claim of the '737 patent (such as its customers in this District and throughout the United States).

180. The Meta Defendants continue to induce infringement of the '737 patent.

181. The Meta Defendants have contributorily infringed and are contributory infringers because, with knowledge of the '737 patent (since at least the date of this Complaint), they supply a material part of a claimed combination, where the material part is not a staple article of commerce, and is incapable of substantial noninfringing use.

182. The Meta Defendants contribute to their customers' infringement because, with knowledge of the '737 patent, the Meta Defendants supply the technology that allows their customers to infringe the '737 patent.

183. The Meta Defendants have knowledge that their activities concerning the Accused Products infringe one or more claims of the '737 patent.

184. The Meta Defendants' customers, such as consumers or end users, have actually infringed claims of the '737 patent by using the Accused Products in a manner proscribed by the Meta Defendants, and as such, the Meta Defendants' customers are direct infringers.

185. On information and belief, the Meta Defendants will continue to encourage, aid, or otherwise cause third parties to import, sell, offer for sale, and use the Accused Products (which are acts of direct infringement of the '737 patent) and the Meta Defendants have and will continue to encourage those acts with the specific intent to infringe one or more claims of the '737 patent.

186. Further, the Meta Defendants provide information and technical support to their customers, including product manuals, brochures, videos, demonstrations, and website materials encouraging its customers to purchase and instructing them to use the Meta Defendants' Accused Products (which are acts of direct infringement of the '737 patent).

187. Alternatively, the Meta Defendants know and/or will know that there is a high probability that the importation, sale, offer for sale, and use of the Accused Products constitutes direct infringement of the '737 patent but took deliberate actions to avoid learning of these facts.

188. On information and belief, the Meta Defendants' infringement of the '737 patent has been willful and merits increased damages.

189. On information and belief, the Meta Defendants have known that their activities concerning the Accused Products infringed one or more claims of the '737 patent since at least the date of this Complaint.

190. On information and belief, the Meta Defendants have made no attempt to design around the claims of the '737 patent.

191. On information and belief, the Meta Defendants did not have a reasonable basis for believing that the claims of the '737 patent were invalid.

192. On information and belief, the Meta Defendants' Accused Products are available to businesses and individuals throughout the United States and in the State of Texas, including in this District.

193. 8KHZ has been damaged as the result of the Meta Defendants' willful infringement. Upon information and belief, the Meta Defendants will continue to infringe one or more claims of the '737 patent unless and until they are enjoined by this Court.

194. The Meta Defendants have caused and will continue to cause 8KHZ irreparable injury and damage by infringing one or more claims of the '737 patent. 8KHZ will suffer further irreparable injury, for which it has no adequate remedy at law, unless and until the Meta Defendants are enjoined from infringing the claims of the '737 patent.

195. The claim chart attached hereto as **Exhibit M** describes how the elements of an exemplary claim 14 from the '737 patent are infringed by the Accused Products. This provides details regarding only one example of the Meta Defendants' infringement, and only as to a single patent claim, and Plaintiff reserves its right to provide greater detail and scope via its Infringement Contentions at the time required under this Court's scheduling order.

COUNT V
PATENT INFRINGEMENT OF THE '090 PATENT

196. Plaintiff restates and realleges the preceding paragraphs of this Complaint.

197. The Meta Defendants have, under 35 U.S.C. § 271(a), directly infringed, and continue to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including without limitation at least claim 8 of the '090 patent, by making, using, testing, selling, offering for sale and/or importing into the United States Defendants' Accused Products.

198. The Meta Defendants also indirectly infringe the '090 patent by actively inducing the direct infringement by third parties under 35 U.S.C. § 271(b).

199. The Meta Defendants have knowingly (since at least the date of this Complaint) and intentionally actively aided, abetted and induced others to directly infringe at least one claim of the '090 patent (such as its customers in this District and throughout the United States).

200. The Meta Defendants continue to induce infringement of the '090 patent.

201. The Meta Defendants have contributorily infringed and are contributory infringers because, with knowledge of the '090 patent (since at least the date of this Complaint), they supply a material part of a claimed combination, where the material part is not a staple article of commerce, and is incapable of substantial noninfringing use.

202. The Meta Defendants contribute to their customers' infringement because, with knowledge of the '090 patent, the Meta Defendants supply the technology that allows their customers to infringe the '090 patent.

203. The Meta Defendants have knowledge that their activities concerning the Accused Products infringe one or more claims of the '090 patent.

204. The Meta Defendants' customers, such as consumers or end users, have actually infringed claims of the '090 patent by using the Accused Products in a manner proscribed by the Meta Defendants, and as such, the Meta Defendants' customers are direct infringers.

205. On information and belief, the Meta Defendants will continue to encourage, aid, or otherwise cause third parties to import, sell, offer for sale, and use the Accused Products (which are acts of direct infringement of the '090 patent) and Meta Defendants have and will continue to encourage those acts with the specific intent to infringe one or more claims of the '090 patent.

206. Further, the Meta Defendants provide information and technical support to their customers, including promotional materials, product manuals, brochures, videos, demonstrations, and website materials encouraging its customers to purchase and instructing them to use the Meta Defendants' Accused Products (which are acts of direct infringement of the '090 patent).

207. Alternatively, the Meta Defendants know and/or will know that there is a high probability that the importation, sale, offer for sale, and use of the Accused Products constitutes direct infringement of the '090 patent but took deliberate actions to avoid learning of these facts.

208. On information and belief, the Meta Defendants' infringement of the '090 patent has been willful and merits increased damages.

209. On information and belief, the Meta Defendants have known that their activities concerning the Accused Products infringed one or more claims of the '090 patent since at least the date of this Complaint.

210. On information and belief, the Meta Defendants have made no attempt to design around the claims of the '090 patent.

211. On information and belief, the Meta Defendants did not have a reasonable basis for believing that the claims of the '090 patent were invalid.

212. On information and belief, the Meta Defendants' Accused Products are available to businesses and individuals throughout the United States and in the State of Texas, including in this District.

213. 8KHZ has been damaged as the result of the Meta Defendants' willful infringement. Upon information and belief, the Meta Defendants will continue to infringe one or more claims of the '090 patent unless and until they are enjoined by this Court.

214. The Meta Defendants have caused and will continue to cause 8KHZ irreparable injury and damage by infringing one or more claims of the '090 patent. 8KHZ will suffer further irreparable injury, for which it has no adequate remedy at law, unless and until the Meta Defendants are enjoined from infringing the claims of the '090 patent.

215. The claim chart attached hereto as **Exhibit N** describes how the elements of an exemplary claim 8 from the '090 patent are infringed by the Accused Products. This provides details regarding only one example of the Meta Defendants' infringement, and only as to a single patent claim, and Plaintiff reserves its right to provide greater detail and scope via its Infringement Contentions at the time required under this Court's scheduling order.

COUNT VI
PATENT INFRINGEMENT OF THE '179 PATENT

216. Plaintiff restates and realleges the preceding paragraphs of this Complaint.

217. Defendants have, under 35 U.S.C. § 271(a), directly infringed, and continue to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including without limitation at least claim 14 of the '179 patent, by making, using, testing, selling, offering for sale and/or importing into the United States Defendants' Accused Products.

218. Defendants also indirectly infringe the '179 patent by actively inducing the direct infringement by third parties under 35 U.S.C. § 271(b).

219. Defendants have knowingly (since at least the date of this Complaint) and intentionally actively aided, abetted and induced others to directly infringe at least one claim of the '179 patent (such as its customers in this District and throughout the United States).

220. Defendants continue to induce infringement of the '179 patent.

221. Defendants have contributorily infringed and are contributory infringers because, with knowledge of the '179 patent (since at least the date of this Complaint), they supply a material part of a claimed combination, where the material part is not a staple article of commerce, and is incapable of substantial noninfringing use.

222. Defendants contribute to their customers' infringement because, with knowledge of the '179 patent, Defendants supply the technology that allows their customers to infringe the '179 patent.

223. Defendants have knowledge that their activities concerning the Accused Products infringe one or more claims of the '179 patent.

224. Defendants' customers, such as consumers or end users, have actually infringed claims of the '179 patent by using the Accused Products in a manner proscribed by Defendants, and as such, Defendants' customers are direct infringers.

225. On information and belief, Defendants will continue to encourage, aid, or otherwise cause third parties to import, sell, offer for sale, and use the Accused Products (which are acts of direct infringement of the '179 patent) and Defendants have and will continue to encourage those acts with the specific intent to infringe one or more claims of the '179 patent.

226. Further, Defendants provide information and technical support to their customers, including promotional materials, product manuals, brochures, videos, demonstrations, and website materials encouraging its customers to purchase and instructing them to use Defendants' Accused Products (which are acts of direct infringement of the '179 patent).

227. Alternatively, Defendants know and/or will know that there is a high probability that the importation, sale, offer for sale, and use of the Accused Products constitutes direct infringement of the '179 patent but took deliberate actions to avoid learning of these facts.

228. On information and belief, Defendants' infringement of the '179 patent has been willful and merits increased damages.

229. On information and belief, Defendants have known that their activities concerning the Accused Products infringed one or more claims of the '179 patent since at least the date of this Complaint.

230. On information and belief, Defendants have made no attempt to design around the claims of the '179 patent.

231. On information and belief, Defendants did not have a reasonable basis for believing that the claims of the '179 patent were invalid.

232. On information and belief, Defendants' Accused Products are available to businesses and individuals throughout the United States and in the State of Texas, including in this District.

233. 8KHZ has been damaged as the result of Defendants' willful infringement. Upon information and belief, Defendants will continue to infringe one or more claims of the '179 patent unless and until they are enjoined by this Court.

234. Defendants have caused and will continue to cause 8KHZ irreparable injury and damage by infringing one or more claims of the '179 patent. 8KHZ will suffer further irreparable injury, for which it has no adequate remedy at law, unless and until Defendants are enjoined from infringing the claims of the '179 patent.

235. The claim chart attached hereto as **Exhibit O** and **Exhibit O-1** describes how the elements of an exemplary claim 14 from the '179 patent are infringed by the Accused Products. This provides details regarding only one example of Defendants' infringement, and only as to a single patent claim, and Plaintiff reserves its right to provide greater detail and scope via its Infringement Contentions at the time required under this Court's scheduling order.

COUNT VII
PATENT INFRINGEMENT OF THE '509 PATENT

236. Plaintiff restates and realleges the preceding paragraphs of this Complaint.

237. The Meta Defendants have, under 35 U.S.C. § 271(a), directly infringed, and continue to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including without limitation at least claim 9 of the '509 patent, by making, using, testing, selling, offering for sale and/or importing into the United States Defendants' Accused Products.

238. The Meta Defendants also indirectly infringe the '509 patent by actively inducing the direct infringement by third parties under 35 U.S.C. § 271(b).

239. The Meta Defendants have knowingly (since at least the date of this Complaint) and intentionally actively aided, abetted and induced others to directly infringe at least one claim of the '509 patent (such as its customers in this District and throughout the United States).

240. The Meta Defendants continue to induce infringement of the '509 patent.

241. The Meta Defendants have contributorily infringed and are contributory infringers because, with knowledge of the '509 patent (since at least the date of this Complaint), they supply a material part of a claimed combination, where the material part is not a staple article of commerce, and is incapable of substantial noninfringing use.

242. The Meta Defendants contribute to their customers' infringement because, with knowledge of the '509 patent, the Meta Defendants supply the technology that allows their customers to infringe the '509 patent.

243. The Meta Defendants have knowledge that their activities concerning the Accused Products infringe one or more claims of the '509 patent.

244. The Meta Defendants' customers, such as consumers or end users, have actually infringed claims of the '509 patent by using the Accused Products in a manner proscribed by the Meta Defendants, and as such, the Meta Defendants' customers are direct infringers.

245. On information and belief, the Meta Defendants will continue to encourage, aid, or otherwise cause third parties to import, sell, offer for sale, and use the Accused Products (which are acts of direct infringement of the '509 patent) and the Meta Defendants have and will continue to encourage those acts with the specific intent to infringe one or more claims of the '509 patent.

246. Further, the Meta Defendants provide information and technical support to their customers, including promotional materials, product manuals, brochures, videos, demonstrations, and website materials encouraging its customers to purchase and instructing them to use the Meta Defendants' Accused Products (which are acts of direct infringement of the '509 patent).

247. Alternatively, the Meta Defendants know and/or will know that there is a high probability that the importation, sale, offer for sale, and use of the Accused Products constitutes direct infringement of the '509 patent but took deliberate actions to avoid learning of these facts.

248. On information and belief, the Meta Defendants' infringement of the '509 patent has been willful and merits increased damages.

249. On information and belief, the Meta Defendants have known that their activities concerning the Accused Products infringed one or more claims of the '509 patent since at least the date of this Complaint.

250. On information and belief, the Meta Defendants have made no attempt to design around the claims of the '509 patent.

251. On information and belief, Meta Defendants did not have a reasonable basis for believing that the claims of the '509 patent were invalid.

252. On information and belief, the Meta Defendants' Accused Products are available to businesses and individuals throughout the United States and in the State of Texas, including in this District.

253. 8KHZ has been damaged as the result of the Meta Defendants' willful infringement. Upon information and belief, the Meta Defendants will continue to infringe one or more claims of the '509 patent unless and until they are enjoined by this Court.

254. The Meta Defendants have caused and will continue to cause 8KHZ irreparable injury and damage by infringing one or more claims of the '509 patent. 8KHZ will suffer further irreparable injury, for which it has no adequate remedy at law, unless and until the Meta Defendants are enjoined from infringing the claims of the '509 patent.

255. The claim chart attached hereto as **Exhibit P** describes how the elements of an exemplary claim 9 from the '509 patent are infringed by the Accused Products. This provides details regarding only one example of the Meta Defendants' infringement, and only as to a single patent claim, and Plaintiff reserves its right to provide greater detail and scope via its Infringement Contentions at the time required under this Court's scheduling order.

COUNT VIII
PATENT INFRINGEMENT OF THE '316 PATENT

256. Plaintiff restates and realleges the preceding paragraphs of this Complaint.

257. The Meta Defendants have, under 35 U.S.C. § 271(a), directly infringed, and continue to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including without limitation at least claim 9 of the '316 patent, by making, using, testing, selling, offering for sale and/or importing into the United States Defendants' Accused Products.

258. The Meta Defendants also indirectly infringe the '316 patent by actively inducing the direct infringement by third parties under 35 U.S.C. § 271(b).

259. The Meta Defendants have knowingly (since at least the date of this Complaint) and intentionally actively aided, abetted and induced others to directly infringe at least one claim of the '316 patent (such as its customers in this District and throughout the United States).

260. The Meta Defendants continue to induce infringement of the '316 patent.

261. The Meta Defendants have contributorily infringed and are contributory infringers because, with knowledge of the '316 patent (since at least the date of this Complaint), they supply a material part of a claimed combination, where the material part is not a staple article of commerce, and is incapable of substantial noninfringing use.

262. The Meta Defendants contribute to their customers' infringement because, with knowledge of the '316 patent, the Meta Defendants supply the technology that allows their customers to infringe the '316 patent.

263. The Meta Defendants have knowledge that their activities concerning the Accused Products infringe one or more claims of the '316 patent.

264. The Meta Defendants' customers, such as consumers or end users, have actually infringed claims of the '316 patent by using the Accused Products in a manner proscribed by the Meta Defendants, and as such, the Meta Defendants' customers are direct infringers.

265. On information and belief, the Meta Defendants will continue to encourage, aid, or otherwise cause third parties to import, sell, offer for sale, and use the Accused Products (which are acts of direct infringement of the '316 patent) and the Meta Defendants have and will continue to encourage those acts with the specific intent to infringe one or more claims of the '316 patent.

266. Further, the Meta Defendants provide information and technical support to their customers, including promotional materials, product manuals, brochures, videos, demonstrations, and website materials encouraging its customers to purchase and instructing them to use the Meta Defendants' Accused Products (which are acts of direct infringement of the '316 patent).

267. Alternatively, the Meta Defendants know and/or will know that there is a high probability that the importation, sale, offer for sale, and use of the Accused Products constitutes direct infringement of the '316 patent but took deliberate actions to avoid learning of these facts.

268. On information and belief, the Meta Defendants' infringement of the '316 patent has been willful and merits increased damages.

269. On information and belief, the Meta Defendants have known that their activities concerning the Accused Products infringed one or more claims of the '316 patent since at least the date of this Complaint.

270. On information and belief, the Meta Defendants have made no attempt to design around the claims of the '316 patent.

271. On information and belief, the Meta Defendants did not have a reasonable basis for believing that the claims of the '316 patent were invalid.

272. On information and belief, the Meta Defendants' Accused Products are available to businesses and individuals throughout the United States and in the State of Texas, including in this District.

273. 8KHZ has been damaged as the result of the Meta Defendants' willful infringement. Upon information and belief, the Meta Defendants will continue to infringe one or more claims of the '316 patent unless and until they are enjoined by this Court.

274. The Meta Defendants have caused and will continue to cause 8KHZ irreparable injury and damage by infringing one or more claims of the '316 patent. 8KHZ will suffer further irreparable injury, for which it has no adequate remedy at law, unless and until the Meta Defendants are enjoined from infringing the claims of the '316 patent.

275. The claim chart attached hereto as **Exhibit Q** describes how the elements of an exemplary claim 9 from the '316 patent are infringed by the Accused Products. This provides details regarding only one example of the Meta Defendants' infringement, and only as to a single patent claim, and Plaintiff reserves its right to provide greater detail and scope via its Infringement Contentions at the time required under this Court's scheduling order.

COUNT IX
PATENT INFRINGEMENT OF THE '836 PATENT

276. Plaintiff restates and realleges the preceding paragraphs of this Complaint.

277. The Meta Defendants have, under 35 U.S.C. § 271(a), directly infringed, and continue to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including without limitation at least claim 8 of the '836 patent, by making, using, testing, selling, offering for sale and/or importing into the United States Defendants' Accused Products.

278. The Meta Defendants also indirectly infringe the '836 patent by actively inducing the direct infringement by third parties under 35 U.S.C. § 271(b).

279. The Meta Defendants have knowingly (since at least the date of this Complaint) and intentionally actively aided, abetted and induced others to directly infringe at least one claim of the '836 patent (such as its customers in this District and throughout the United States).

280. The Meta Defendants continue to induce infringement of the '836 patent.

281. The Meta Defendants have contributorily infringed and are contributory infringers because, with knowledge of the '836 patent (since at least the date of this Complaint), they supply a material part of a claimed combination, where the material part is not a staple article of commerce, and is incapable of substantial noninfringing use.

282. The Meta Defendants contribute to their customers' infringement because, with knowledge of the '836 patent, the Meta Defendants supply the technology that allows their customers to infringe the '836 patent.

283. The Meta Defendants have knowledge that their activities concerning the Accused Products infringe one or more claims of the '836 patent.

284. The Meta Defendants' customers, such as consumers or end users, have actually infringed claims of the '836 patent by using the Accused Products in a manner proscribed by the Meta Defendants, and as such, the Meta Defendants' customers are direct infringers.

285. On information and belief, the Meta Defendants will continue to encourage, aid, or otherwise cause third parties to import, sell, offer for sale, and use the Accused Products (which are acts of direct infringement of the '836 patent) and the Meta Defendants have and will continue to encourage those acts with the specific intent to infringe one or more claims of the '836 patent.

286. Further, the Meta Defendants provide information and technical support to their customers, including promotional materials, product manuals, brochures, videos, demonstrations, and website materials encouraging its customers to purchase and instructing them to use the Meta Defendants' Accused Products (which are acts of direct infringement of the '836 patent).

287. Alternatively, the Meta Defendants know and/or will know that there is a high probability that the importation, sale, offer for sale, and use of the Accused Products constitutes direct infringement of the '836 patent but took deliberate actions to avoid learning of these facts.

288. On information and belief, the Meta Defendants' infringement of the '836 patent has been willful and merits increased damages.

289. On information and belief, the Meta Defendants have known that their activities concerning the Accused Products infringed one or more claims of the '836 patent since at least the date of this Complaint.

290. On information and belief, the Meta Defendants have made no attempt to design around the claims of the '836 patent.

291. On information and belief, the Meta Defendants did not have a reasonable basis for believing that the claims of the '836 patent were invalid.

292. On information and belief, the Meta Defendants' Accused Products are available to businesses and individuals throughout the United States and in the State of Texas, including in this District.

293. 8KHZ has been damaged as the result of the Meta Defendants' willful infringement. Upon information and belief, the Meta Defendants will continue to infringe one or more claims of the '836 patent unless and until they are enjoined by this Court.

294. The Meta Defendants have caused and will continue to cause 8KHZ irreparable injury and damage by infringing one or more claims of the '836 patent. 8KHZ will suffer further irreparable injury, for which it has no adequate remedy at law, unless and until the Meta Defendants are enjoined from infringing the claims of the '836 patent.

295. The claim chart attached hereto as **Exhibit R** describes how the elements of an exemplary claim 8 from the '836 patent are infringed by the Accused Products. This provides details regarding only one example of the Meta Defendants' infringement, and only as to a single patent claim, and Plaintiff reserves its right to provide greater detail and scope via its Infringement Contentions at the time required under this Court's scheduling order.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff Eight kHz, LLC respectfully requests the following relief:

A. A judgment that Defendants have directly infringed either literally and/or under the doctrine of equivalents and continue to directly infringe the 8KHZ Patents set forth in this Complaint;

B. A judgment that Defendants have induced infringement and continue to induce infringement of the 8KHZ Patents set forth in this Complaint;

C. A judgment that Defendants have contributorily infringed and continue to contributorily infringe the 8KHZ Patents set forth in this Complaint;

D. A judgment and order requiring Defendants to pay Plaintiff damages under 35 U.S.C. § 284, including treble damages for willful infringement as provided by 35 U.S.C. § 284, and supplemental damages for any continuing post-verdict infringement through entry of the final judgment with an accounting as needed;

E. A judgment that this is an exceptional case within the meaning of 35 U.S.C. § 285 and Plaintiff is therefore entitled to reasonable attorneys' fees;

F. A judgment and order requiring Defendants to pay Plaintiff pre-judgment and post-judgment interest on the damages awarded;

G. A judgment and order awarding a compulsory ongoing royalty;

H. A judgment and order awarding Plaintiff costs associated with bringing this action;

I. A judgment granting a preliminary and permanent injunction that restrains and enjoins Defendants, their officers, directors, divisions, employees, agents, servants, parents, subsidiaries, successors, assigns, and all those in privity, concert or participation with them from directly or indirectly infringing the 8KHZ Patents; and

J. Such further relief as the Court deems just and equitable.

JURY TRIAL DEMANDED

Pursuant to FED. R. CIV. P. 38, Plaintiff Eight kHz, LLC hereby demands a trial by jury on all issues so triable.

Dated: October 7, 2022

Respectfully submitted,

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EIGHT KHZ, LLC
v.
META PLATFORMS, INC.; META PLATFORMS TECHNOLOGIES, LLC
Case No. 6:22-cv-00575-ADA

Asserted U.S. Patent No. 10,448,184
"Switching Binaural Sound"

Representative Product

Accused Product

This claim chart is based on publicly available literature regarding Defendants' products. Plaintiff will be seeking Defendants' internal documentation, including technical documentation such as schematics and datasheets, in discovery and therefore Plaintiff reserves the right to amend or further supplement this claim chart.

The term "Accused Products" herein refers to all products manufactured, used, tested, imported, or sold by or on behalf of Defendants practicing the Asserted Claims of the '184 Patent, and all processes employed by Defendants that practice the Asserted Claims of the '184 Patent, consisting of at least Defendants' products that support Oculus, including by way of example and without limitation the Oculus Quest product lines. On information and belief, such Accused Products include without limitation the following: Oculus Go, Oculus Rift S, Oculus Quest, Oculus Quest 2, and "Path of the Warrior." To the extent Defendants have substituted the name "Meta" or "Reality Labs" for "Oculus" in any of the above products, such products are also included in the Accused Products.

This claim chart specifically addresses infringement of Claim 14 ("Asserted Claim") of the '184 Patent by Defendants' Oculus Quest 2 product and Defendant's software title "Path of the Warrior." Defendants' Oculus Quest 2 product is representative of Defendants' infringement of the Asserted Claim. While this chart specifically addresses the functionality of the Oculus Quest 2, these infringement contentions are illustrative rather than exhaustive and they are representative of, and apply to, all Accused Products based on the fact that all the Accused Products infringe in the same general way.

'184 Patent
Claim: 14 – Preamble[1]
A method executed by one or more electronic devices, the method comprising:
• The Accused Products include one or more electronic devices capable of performing the patented method. • By way of example, the Quest 2 provides all-in-one virtual reality (VR) through its headset and hand-held controllers. These electronic devices practice the patented method.
2

Source: https://store.facebook.com/quest/products/quest-2/

Source: https://store.facebook.com/quest/products/quest-2/tech-specs/#tech-specs

[1]By charting the preamble, we do not concede that the preamble is a limitation and reserve the right to contend that the preamble is not a limitation of the claim.

'184 Patent
Claim: 14 – Element (A)
storing head-related transfer functions (HRTFs);
• Defendants' public literature confirms the Accused Products utilize HRTFs to localize sound and create 3D Audio spatialization.
3

3D Audio Spatialization

An essential element of VR audio is spatialization: the ability to play a sound as if it is positioned at a specific point in three-dimensional space. Spatial audio is essential to deliver an immersive experience because it provides powerful cues that make the user feel they are actually in the 3D environment.

The Audio Localization page discussed how humans localize audio sources in three dimensions, we will now explore methods to synthesize those localization cues, to produce spatial audio.

The two key components to spatialization are direction and distance, in this guide we'll cover both of these topics, and the technologies which enable them.

Directional Spatialization with Head-Related Transfer Functions (HRTFs)

The sounds we experience are directly impacted by the shape and geometry of our body (especially our ear), as well as direction of the incoming sound. These two elements: our body + the direction of the audio source, form the basis of HRTFs which are filters we use to localize sound.

Applying HRTFs

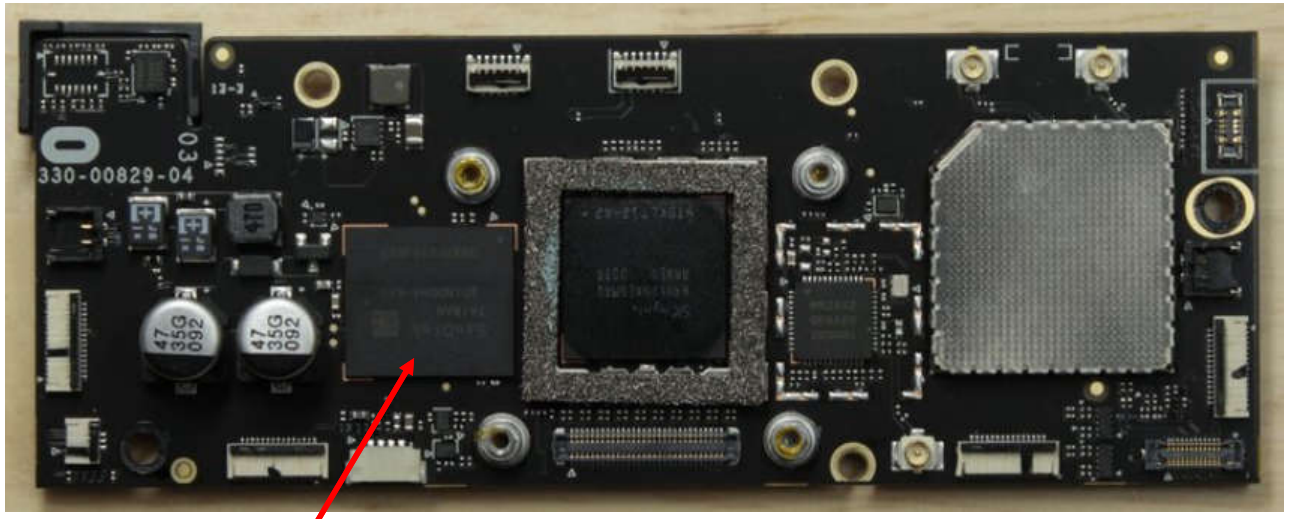
Given an HRTF set, if we know the direction we want a sound to appear to come from, we can select an appropriate HRTF and apply it to the sound. This is usually done either in the form of a time-domain convolution or a frequency domain convolution using FFT. If you don't know what these are, don't worry - those details are only relevant if you are implementing the HRTF system yourself. Our discussion glosses over a lot of the implementation details (e.g., how we store an HRTF, how we use it when processing a sound). For our purposes, what matters is the high-level concept: we are simply filtering an audio signal to make it sound like it's coming from a specific direction.

Since HRTFs take the listener's head geometry into account, it is important to use headphones when performing spatialization. Without headphones, you are effectively applying two HRTFs: the simulated one, and the actual HRTF caused by the geometry of your body.

Source: https://developer.oculus.com/resources/audio-intro-spatialization/

Claim 14, Element (A) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

'184 Patent
Claim: 14 – Element (A)
storing head-related transfer functions (HRTFs);
• The Accused Products store head-related transfer functions. • The Accused Products store HRTFs in their headsets. • By way of example, the Quest 2 has a control board with a SanDisk SDINDDH4-64G flash storage memory for storing, among other things, HRTFs.
4



Source: https://www.ifixit.com/Guide/Oculus+Quest+2+Disassembly/139759

Source: https://guide-images.cdn.ifixit.com/igi/CjSJdC2aPnZfBKcK.huge

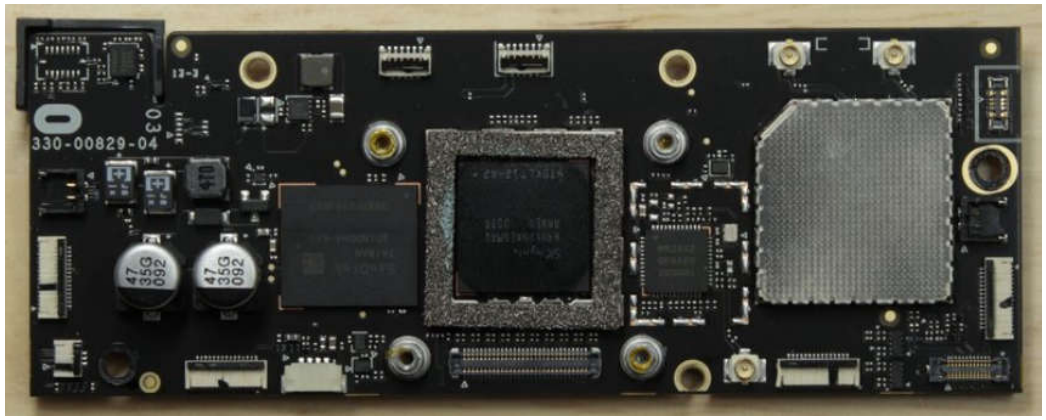
Claim 14, Element (A) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

'184 Patent
Claim: 14 – Element (B)
displaying, with a wearable electronic device (WED) worn on a head of a user, a virtual image in an environment;
• The Accused Products include a headset, which is a wearable electronic device (WED) worn on the head of a user, with a display. • The headset/WED displays a virtual image in an environment. • By way of example only, a virtual image in an environment is shown to the right. This image is taken from a video stream of the "Path of the Warrior" game application.
5

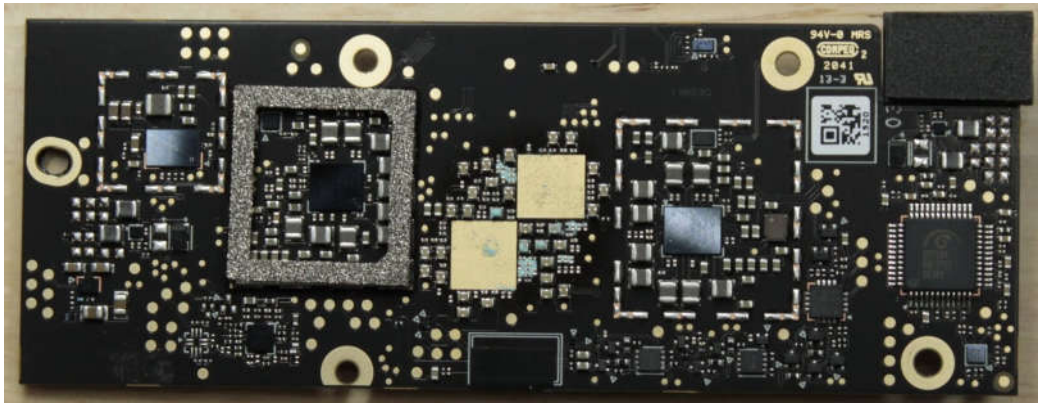
Source: Screen capture of "Path of the Warrior" game

Claim 14, Element (B) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

'184 Patent
Claim: 14 – Element (C)
processing, by a digital signal processor (DSP), sound with the HRTFs to generate binaural sound that externally localizes to the user at the virtual image in the environment; and
• The Accused Products process sound using a DSP. • By way of example, the Quest 2 includes a Qualcomm Snapdragon processor that processes the Accused Products' spatial audio, including the binaural sound that externally localizes to the user. See also https://www.youtube.com/watch?v=VehZkzX4EcE&t=198s • By way of further example, the Accused Products also include an integrated DSP chip. The screenshot on the right shows a CM7104 chip as a component within the Quest 2.
6



Source: https://www.ifixit.com/Guide/Oculus+Quest+2+Disassembly/139759



Source: https://www.ifixit.com/Guide/Oculus+Quest+2+Disassembly/139759

INTRODUCTION

CM7104 is a powerful 310MHz audio DSP with low power consumption. CM7104 DSP supports Cmedia Xear™ Surround Headphone, Dynamic Bass and parametric 10 bands equalizer for gaming solutions. It integrates 768KByte internal memory, I2C, SPI and 2-pair 24bit/8kHz~192kHz I2S digital I/O interface. It also integrates high-quality audio codec for audio playback and recording. CM7104 is a high performance and low power consumption for gaming applications.

Source: https://www.cmedia.com.tw/products/AUDIO_PROCESSOR/CM7104

Claim 14, Element (C) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

'184 Patent
Claim: 14 – Element (C)
processing, by a digital signal processor (DSP), sound with the HRTFs to generate binaural sound that externally localizes to the user at the virtual image in the environment; and
• The Accused Products process, by a digital signal processor (DSP), sound with the HRTFs to generate binaural sound that externally localizes to the user at the virtual image in the environment. • As explained in the screenshots to the right, the Accused Products apply HRTFs in order to localize sound and create 3D audio spatialization. • Binaural sound is generated in the WED via a DSP that localizes to the user at the virtual image in the environment.
7

3D Audio Spatialization

An essential element of VR audio is spatialization: the ability to play a sound as if it is positioned at a specific point in three-dimensional space. Spatial audio is essential to deliver an immersive experience because it provides powerful cues that make the user feel they are actually in the 3D environment.

The Audio Localization page discussed how humans localize audio sources in three dimensions, we will now explore methods to synthesize those localization cues, to produce spatial audio.

The two key components to spatialization are direction and distance, in this guide we'll cover both of these topics, and the technologies which enable them.

Directional Spatialization with Head-Related Transfer Functions (HRTFs)

The sounds we experience are directly impacted by the shape and geometry of our body (especially our ear), as well as direction of the incoming sound. These two elements: our body + the direction of the audio source, form the basis of HRTFs which are filters we use to localize sound.

Applying HRTFs

Given an HRTF set, if we know the direction we want a sound to appear to come from, we can select an appropriate HRTF and apply it to the sound. This is usually done either in the form of a time-domain convolution or a frequency domain convolution using FFT. If you don't know what these are, don't worry - those details are only relevant if you are implementing the HRTF system yourself. Our discussion glosses over a lot of the implementation details (e.g., how we store an HRTF, how we use it when processing a sound). For our purposes, what matters is the high-level concept: we are simply filtering an audio signal to make it sound like it's coming from a specific direction.

Since HRTFs take the listener's head geometry into account, it is important to use headphones when performing spatialization. Without headphones, you are effectively applying two HRTFs: the simulated one, and the actual HRTF caused by the geometry of your body.

Source: https://developer.oculus.com/resources/audio-intro-spatialization/

Claim 14, Element (C) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

'184 Patent
Claim: 14 – Element (C)
processing, by a digital signal processor (DSP), sound with the HRTFs to generate binaural sound that externally localizes to the user at the virtual image in the environment; and

- By way of example only, the video to the right shows a virtual environment, including a virtual image of a game character.
- As shown in the video, the Accused Products generate binaural sound that externally localizes to the user at the virtual image.
- Specifically, binaural sound is provided to the user such that the sound is externally localized as originating from the location of the game character , such as when he falls out of the ceiling, or grunts when punched.

Source: Screen captures of “Path of the Warrior” game

Claim 14, Element (C) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

'184 Patent
Claim: 14 – Element (D)
alerting the user that the user is leaving the virtual image in the environment by altering processing of the binaural sound by the DSP and reducing a volume of the binaural sound that localizes to the user at the virtual image.
• The Accused Products alert the user that the user is leaving the virtual image in the environment by altering processing of the binaural sound by the DSP and reducing a volume of the binaural sound that localizes to the user at the virtual image. • By way of example, the video to the right illustrates that when the user moves outside of the game environment, the Accused Products alert the user by reducing the volume of the binaural sound and displaying the message "Return to Play Area."
9

Source: Screen capture of "Path of the Warrior" game

Claim 14, Element (D) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

EIGHT KHZ, LLC
v.
META PLATFORMS, INC.; META PLATFORMS TECHNOLOGIES, LLC

Case No. 6:22-cv-00575-ADA

Asserted U.S. Patent No. 10,368,179
"Switching Binaural Sound"

Representative Product

Accused Product

This claim chart is based on publicly available literature regarding Defendants' products. Plaintiff will be seeking Defendants' internal documentation, including technical documentation such as schematics and datasheets, in discovery and therefore Plaintiff reserves the right to amend or further supplement this claim chart.

The term "Accused Products" herein refers to all products manufactured, used, tested, imported, or sold by or on behalf of Defendants practicing the Asserted Claims of the '179 Patent, and all processes employed by Defendants that practice the Asserted Claims of the '179 Patent, consisting of at least Defendants' products that support Oculus, including by way of example and without limitation the Oculus Quest product lines. On information and belief, such Accused Products include without limitation the following: Oculus Go, Oculus Rift S, Oculus Quest, Oculus Quest 2, and "Path of the Warrior." To the extent Defendants have substituted the name "Meta" or "Reality Labs" for "Oculus" in any of the above products, such products are also included in the Accused Products.

This claim chart specifically addresses infringement of Claim 14 ("Asserted Claim") of the '179 Patent by Defendants' Oculus Quest 2 product and Defendant's software title "Path of the Warrior." Defendants' Oculus Quest 2 product is representative of Defendants' infringement of the Asserted Claim. While this chart specifically addresses the functionality of the Oculus Quest 2, these infringement contentions are illustrative rather than exhaustive and they are representative of, and apply to, all Accused Products based on the fact that all the Accused Products infringe in the same general way.

'179 Patent
Claim: 14 – Preamble[1]
A method executed by one or more electronic devices, the method comprising:
• The Accused Products include one or more electronic devices capable of performing the patented method. • By way of example, the Quest 2 provides all-in-one virtual reality (VR) through its headset and hand-held controllers. These electronic devices perform the claimed method.
2

Source: https://store.facebook.com/quest/products/quest-2/

Source: https://store.facebook.com/quest/products/quest-2/tech-specs/#tech-specs

[1]By charting the preamble, we do not concede that the preamble is a limitation and reserve the right to contend that the preamble is not a limitation of the claim.

'179 Patent
Claim: 14 – Element (A)
storing head-related transfer functions (HRTFs) in memory;
• Defendants' public literature confirms the Accused Products utilize HRTFs to localize sound and create 3D Audio spatialization.
3

3D Audio Spatialization

An essential element of VR audio is spatialization: the ability to play a sound as if it is positioned at a specific point in three-dimensional space. Spatial audio is essential to deliver an immersive experience because it provides powerful cues that make the user feel they are actually in the 3D environment.

The Audio Localization page discussed how humans localize audio sources in three dimensions, we will now explore methods to synthesize those localization cues, to produce spatial audio.

The two key components to spatialization are direction and distance, in this guide we'll cover both of these topics, and the technologies which enable them.

Directional Spatialization with Head-Related Transfer Functions (HRTFs)

The sounds we experience are directly impacted by the shape and geometry of our body (especially our ear), as well as direction of the incoming sound. These two elements: our body + the direction of the audio source, form the basis of HRTFs which are filters we use to localize sound.

Applying HRTFs

Given an HRTF set, if we know the direction we want a sound to appear to come from, we can select an appropriate HRTF and apply it to the sound. This is usually done either in the form of a time-domain convolution or a frequency domain convolution using FFT. If you don't know what these are, don't worry - those details are only relevant if you are implementing the HRTF system yourself. Our discussion glosses over a lot of the implementation details (e.g., how we store an HRTF, how we use it when processing a sound). For our purposes, what matters is the high-level concept: we are simply filtering an audio signal to make it sound like it's coming from a specific direction.

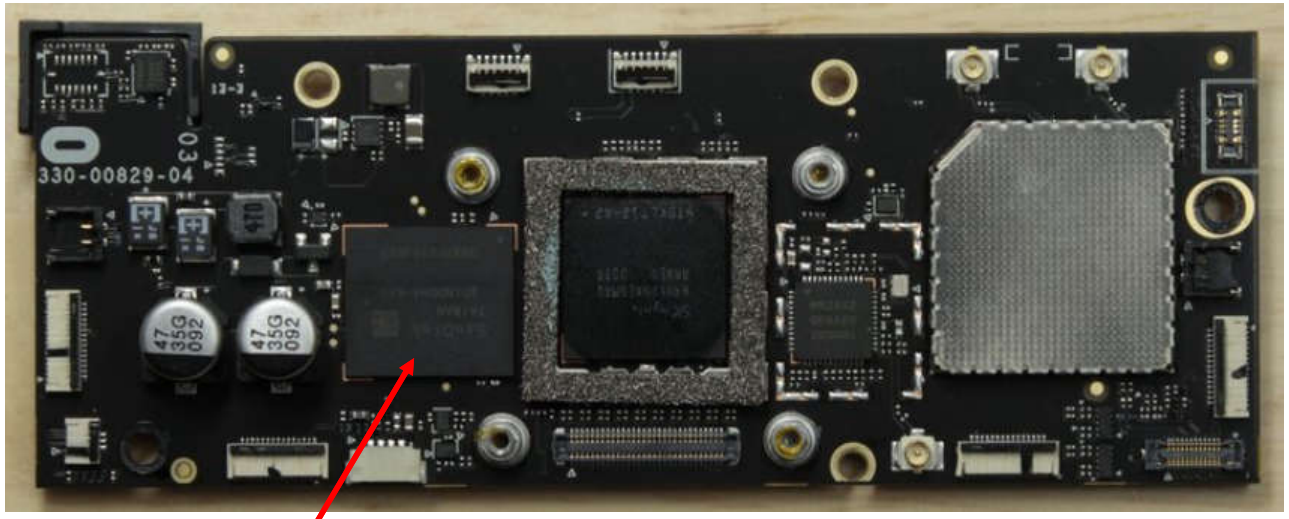
Since HRTFs take the listener's head geometry into account, it is important to use headphones when performing spatialization. Without headphones, you are effectively applying two HRTFs: the simulated one, and the actual HRTF caused by the geometry of your body.

Source: https://developer.oculus.com/resources/audio-intro-spatialization/

Claim 14, Element (A) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

Exhibit O-1: Chart re Twisted Pixel

'179 Patent
Claim: 14 – Element (A)
storing head-related transfer functions (HRTFs) in memory;
• The Accused Product store head-related transfer functions. • The Accused Products store HRTFs in their headsets. • By way of example, the Quest 2 has a control board with a SanDisk SDINDDH4-64G flash storage memory for storing, among other things, HRTFs.
4



Source: https://www.ifixit.com/Guide/Oculus+Quest+2+Disassembly/139759

Source: https://guide-images.cdn.ifixit.com/igi/CjSJdC2aPnZfBKcK.huge

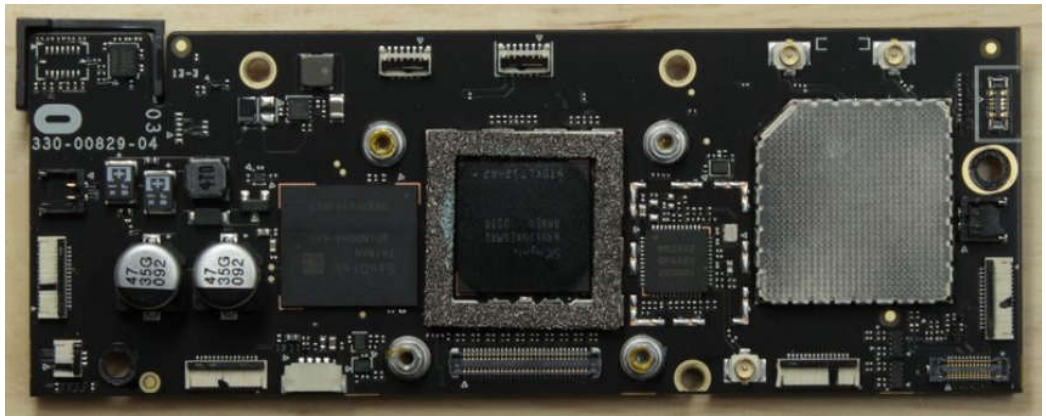
Claim 14, Element (A) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

'179 Patent
Claim: 14 – Element (B)
displaying, with a wearable electronic device (WED) worn on a head of a user, a virtual image in an environment;
• The Accused Products include a headset, which is a wearable electronic device (WED) worn on the head of a user, with a display. • The headset/WED displays a virtual image in an environment. • By way of example only, a virtual image in an environment is shown to the right. This image is taken from a video stream of the "Path of the Warrior" game application.
5

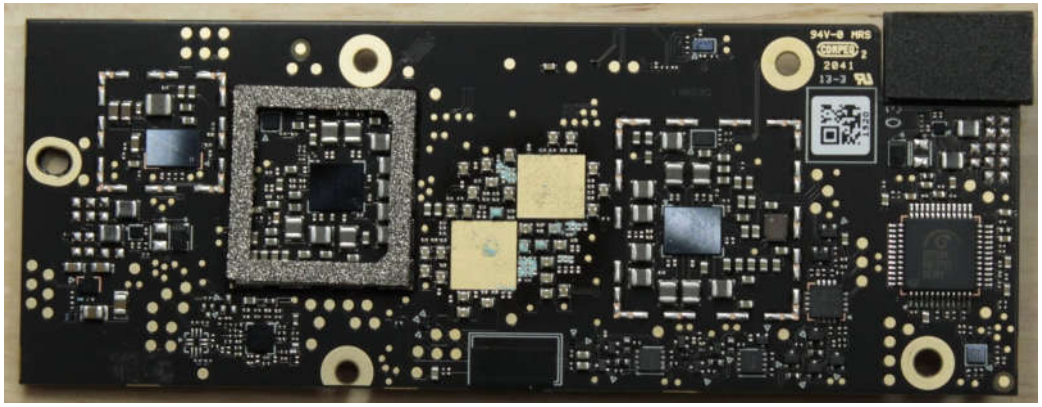
Source: Screen capture of "Path of the Warrior" game

Claim 14, Element (B) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

'179 Patent
Claim: 14 – Element (C)
processing, by a digital signal processor (DSP), sound with the HRTFs to generate binaural sound that externally localizes in empty space from the virtual image in the environment;
• The Accused Products process sound using an DSP. • By way of example, the Quest 2 includes a Qualcomm Snapdragon processor that processes the Accused Products' spatial audio, including the binaural sound that externally localizes in empty space to the user. See also https://www.youtube.com/watch?v=VehZkzX4EcE&t=198s • By way of further example, the Accused Products include an integrated DSP chip. The screenshot on the right shows a CM7104 chip as a component within the Quest 2.
6



Source: https://www.ifixit.com/Guide/Oculus+Quest+2+Disassembly/139759



Source: https://www.ifixit.com/Guide/Oculus+Quest+2+Disassembly/139759

INTRODUCTION

CM7104 is a powerful 310MHz audio DSP with low power consumption. CM7104 DSP supports Cmedia Xear™ Surround Headphone, Dynamic Bass and parametric 10 bands equalizer for gaming solutions. It integrates 768KByte internal memory, I2C, SPI and 2-pair 24bit/8kHz~192kHz I2S digital I/O interface. It also integrates high-quality audio codec for audio playback and recording. CM7104 is a high performance and low power consumption for gaming applications.

Source: https://www.cmedia.com.tw/products/AUDIO_PROCESSOR/CM7104

Claim 14, Element (C) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

'179 Patent
Claim: 14 – Element (C)
processing, by a digital signal processor (DSP), sound with the HRTFs to generate binaural sound that externally localizes in empty space from the virtual image in the environment;
• The Accused Products process, by a digital signal processor (DSP), sound with the HRTFs to generate binaural sound that externally localizes in empty space from the virtual image in the environment. • Binaural sound is generated in the WED via a DSP that localizes to the user in empty space from the virtual image in the environment.
7

3D Audio Spatialization

An essential element of VR audio is spatialization: the ability to play a sound as if it is positioned at a specific point in three-dimensional space. Spatial audio is essential to deliver an immersive experience because it provides powerful cues that make the user feel they are actually in the 3D environment.

The Audio Localization page discussed how humans localize audio sources in three dimensions, we will now explore methods to synthesize those localization cues, to produce spatial audio.

The two key components to spatialization are direction and distance, in this guide we'll cover both of these topics, and the technologies which enable them.

Directional Spatialization with Head-Related Transfer Functions (HRTFs)

The sounds we experience are directly impacted by the shape and geometry of our body (especially our ear), as well as direction of the incoming sound. These two elements: our body + the direction of the audio source, form the basis of HRTFs which are filters we use to localize sound.

Applying HRTFs

Given an HRTF set, if we know the direction we want a sound to appear to come from, we can select an appropriate HRTF and apply it to the sound. This is usually done either in the form of a time-domain convolution or a frequency domain convolution using FFT. If you don't know what these are, don't worry - those details are only relevant if you are implementing the HRTF system yourself. Our discussion glosses over a lot of the implementation details (e.g., how we store an HRTF, how we use it when processing a sound). For our purposes, what matters is the high-level concept: we are simply filtering an audio signal to make it sound like it's coming from a specific direction.

Since HRTFs take the listener's head geometry into account, it is important to use headphones when performing spatialization. Without headphones, you are effectively applying two HRTFs: the simulated one, and the actual HRTF caused by the geometry of your body.

Source: https://developer.oculus.com/resources/audio-intro-spatialization/

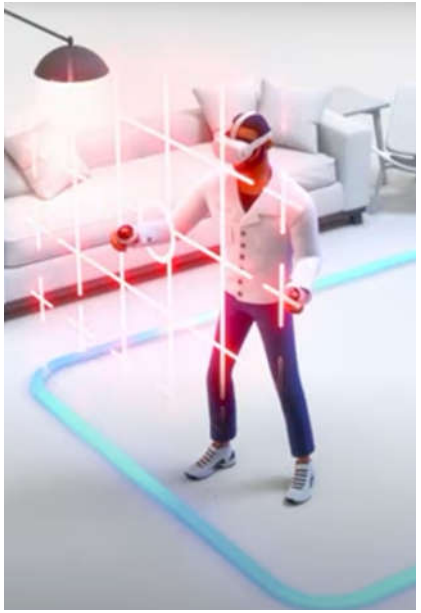
Claim 14, Element (C) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

'179 Patent
Claim: 14 – Element (C)
processing, by a digital signal processor (DSP), sound with the HRTFs to generate binaural sound that externally localizes in empty space from the virtual image in the environment;
• By way of example only, the video to the right shows the virtual environment, including a virtual image of a game character. • As shown in the video, the Accused Products generate binaural sound that externally localizes to the user at the virtual image. • Specifically, binaural sound is provided to the user such that the sound is externally localized as originating from the location of the game character, such as when he falls out of the ceiling, or grunts when punched.
8

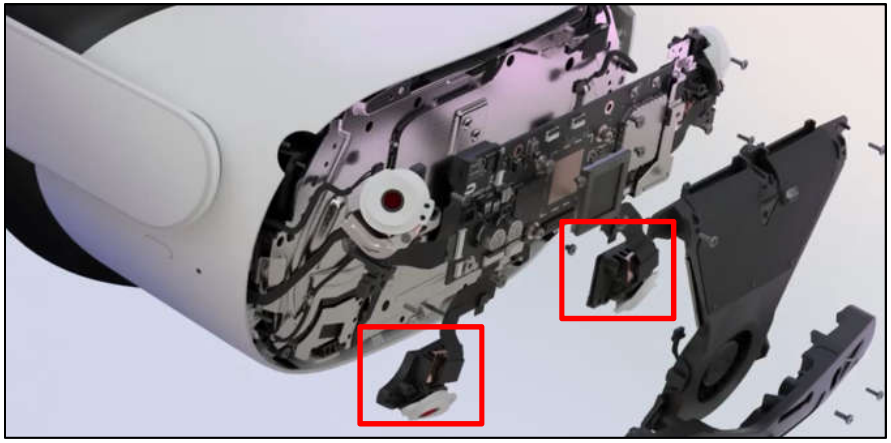
Source: Screen captures of “Path of the Warrior” game

Claim 14, Element (C) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

'179 Patent
Claim: 14 – Element (D)
determining, with the WED, when the user is leaving the environment; and
• The Accused Products, with the WED, determine when the user is leaving the environment. • By way of example, the Quest 2 WED contains at least two infrared cameras that can detect infrared light emitted from the ring on each hand-held controller (PED), and this detection helps track the motion of the PED, including with the PED (and thus the user) is leaving the zone.
9



Source: https://www.youtube.com/watch?v=GojevL05Avw at 1:48 and 2:07



Source: https://www.oculus.com/quest-2/

Claim 14, Element (D) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

'179 Patent
Claim: 14 – Element (E)
alerting the user that the user is leaving the environment by reducing a volume of the binaural sound that localizes from the virtual image and that is being provided to the user.
• The Accused Products include speakers for audio playback. • The Accused Products alert the user that the user is leaving the environment by reducing a volume of the binaural sound that localizes from the virtual image and that is being provided to the user. • By way of example, the video to the right illustrates that when the user moves outside of the game environment, the Accused Products alert the user by reducing the volume of the binaural sound and displaying the message "Return to Play Area."
10

SOUND	**Positional Audio** 3D positional audio is built directly into the headset, allowing you to hear what's all around you. The 3.5 mm audio port lets you play with or without headphones.

Source: https://store.facebook.com/quest/products/quest-2/tech-specs/#tech-specs

Source: Screen capture of "Path of the Warrior" game

Claim 14, Element (E) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.