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-DTG **JURY TRIAL DEMANDED**

PLAINTIFF'S CLAIM CONSTRUCTION REPLY BRIEF

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I. INTRODUCTION

Defendants' brief invites the Court to construe the Patents-in-Suit in a fundamentally erroneous way. Defendants use a potpourri of tactics to either improperly limit the claims well-short of their intended scope or, going to the other extreme, distort the plain meaning to point that they disingenuous contend the claims are indefinite. In almost every case, the Defendants urge these skewed readings by avoiding the natural and plain meaning of the terms, and without any tethering their arguments to the intrinsic record. For example, Defendants urge an idiosyncratic definition of the well-known structure of a "Digital Signal Processor" asking the Court to adopt an idiosyncratic position that it's a processor (and only a physical processor) that performs "better" than a "general" processor. *See infra* at 20. Defendants do not point to anything in the intrinsic record, as they are simply asking the Court to cobble this vague definition out of whole cloth and expert ipse dixit. Other constructions improperly exclude embodiments of the invention expressly taught in the specification. They propose a construction of term "electronic call" and other equivalent terms which would only include one party using a "phone," implying that unless Alexander Graham Bell could recognize one of the devices used in the conversation, these patents, which are directed to virtual reality devices, would not be relevant. This absurd notion is even further removed from reality given that the enumerated embodiments in the specification, which they ignore, expressly state otherwise. *See infra* at 4. Variations of these errors are repeated throughout their brief and make each of Defendants proposed constructions untenable.

Beyond these disputes, Defendants also asks this Court to find numerous instances of "means-plus-function" constructions woven throughout the patents. Defendants vaguely point to giant blocks of text—one going on for 160 words—hoping that somewhere in the mass of text there is some indication that a means-plus-function construction is warranted. But strangely, despite broadcasting their net into paragraphs of text, Defendants cannot fish out any single word that

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would indicate such a construction is warranted; there is no use of a word like "means" or other "nonce" term that would indicate the need for this construction. Yet, Defendants urge that it must be there if the Court simply sifts through the text enough. Not only is that unpersuasive, it is also unfair. Indeed, the fact that these giant walls of text concealed, rather than illuminated their position was brought before this Court at a hearing some months ago. Although the Court did not require Defendants to narrow or target their proposed terms, they were warned that the Court would ultimately pass judgment on the reasonableness of their proposal. So even if the Court was inclined to follow Defendants into a means-plus-function analysis—and it should not— the Court should hold them to their hide-the-ball identification of "terms." Based on these giant swaths of text, the Court should find abundant structures disclosed throughout the specification. And as for the more targeted few words revealed for the first time in their opening brief, the Court should also find corresponding support as set forth below. But the better argument is that Court should not go down the path of means-plus-function in the first place.

Finally, the Court should note Defendants devote large portions of their brief to phantom disputes and wasting the Court's time. The parties agree that four terms shsould be given their plain and ordinary meaning, but Defendants insist on the Court adjudicate a dispute regarding "backup" constructions. Defendants further insist on constructions for two additional terms ("wearable electronic device" and "handheld portable electronic device") for which they also somehow assert no construction is needed. If there is agreement that there is plain and ordinary meaning, why is there a need for the Court to waste time and resources analyzing the issue? Defendants do not adequately explain this in their opening brief, but regardless, Plaintiff will address (briefly) those arguments in the sections below.

In contrast, Plaintiff offers constructions that stay true to the claim language as understood by a person having ordinary skill in the art ("PHOSITA") at the time of the invention and align most naturally with the intrinsic record. As explained below, the Court should reject Defendants' attempts to manufacture non-infringement or artificial invalidity through flawed constructions and either find the claims to have their plain and ordinary meaning adopt Plaintiff's proposed constructions in full.

II. JOINT PROPOSED CONSTRUCTIONS

The parties agree on these constructions for the following terms:

Claim Term	Agreed Construction
"sound localization point" / "SLP" '090 Pat., cls. 8, 14, 15; '196 Pat., cls. 1, 4, 15, 19; '628 Pat., cls. 9, 12; '509 Pat., cls. 9, 10, 17; '737 Pat., cls. 1, 14, 15, 16; '316 Pat., cls. 9, 10, 14; '836 Pat., cls. 8, 10.	Plain and ordinary meaning, but if the Court prefers to construe this term, then "location where a listener localizes sound".
"near-field distance" '836 Pat., cls. 8, 10.	"distance less than one meter"
"far-field distance" '836 Pat., cls. 8, 10.	"distance greater than or equal to one meter"

III. CONSTRUCTION OF DISPUTED CLAIM TERMS

Defendants are not entitled to a claim construction different from a disputed term's plain and ordinary meaning unless the intrinsic record "clearly set[s] forth a definition of the disputed claim term other than its plain and ordinary meaning," which is not the case here. *See Akamai Techs., Inc. v. Limelight Networks, Inc.*, 805 F.3d 1368, 1375 (Fed. Cir. 2015). Defendants fail to justify any "special definition[s]" for the disputed claim terms of U.S. Patent Nos. 9,226,090, 9,282,196, 9,674,628, 10,368,179, 10,448,184, 10,798,509, 10,917,737, 11,172,316, and

11,290,836 (the "Patents-in-Suit"). This Court should reject Defendants' desired constructions and adopt 8kHz's constructions which stay true to the patent and claim construction standards.

A. "electronic call," "electronic phone call," and "telephone call"

Claim Term	8kHz's Construction	Defendants' Construction
"electronic call" '090 Pat., cls. 8, 14.	Ordinary and customary meaning, but if the Court requires a construction, "voice communication over an electronic network between at least two parties".	Plain and ordinary meaning, which is "call between at least two parties".
"electronic phone call" '090 Pat., cl. 15.	Ordinary and customary meaning, but if the Court requires a construction, "voice communication over an electronic network between at least two parties".	Plain and ordinary meaning, which is "call between at least two parties using at least one phone".
"telephone call" '628 Pat., cls. 9, 12, 16.	Ordinary and customary meaning, but if the Court requires a construction, "voice communication over an electronic network between at least two parties".	Plain and ordinary meaning, which is "call between at least two parties using at least one phone".

As shown above, **the parties agree that the plain and ordinary meanings apply**, so the Court need not construe these claim terms. In fact, both parties further agree that the construction of each of these terms has phraseology that includes "at least two parties." However, Defendants insist that the phrases "electronic phone call," and "telephone call" include "using at least one phone." This is misleading and incorrect, as (1) there is no requirement for the use of a "phone" in *any* of the claim terms, and (2) the three terms are used interchangeably throughout.

1. Using a standard "phone" is not disclosed in the embodiments, and in fact defeats the entire purpose of the invention.

Contrary to Defendants' baseless contention that a PHOSITA would understand both a "phone call" and "telephone call" to require a phone, *nowhere* in any embodiment of the '090 Patent is there a *requirement* that there is at least one phone used in a conversation. For the Patents-in-Suit, a PHOSITA would have several years of academic and/or professional experience in a technical field relevant to digital audio signal processing, such as electrical engineering, computer engineering, or computer science; and a familiarity with relevant literature and concepts concerning

virtual "3D" audio processing, which were widely available at the time of disclosure (2014). Ex. 7. Begault Decl. ¶7. The very essence of the '090 Patent (which can be gleaned from the title "SOUND LOCALIZATION FOR AN ELECTRONIC CALL") is to assign a sound localization point (SLP) for binaural sound. '090 Patent at 2:50-67. Perceiving an SLP by a person is *simply not possible* when using a normal telephone (unless earphones or a headset is used) because, as a threshold matter, a "phone," (including modern smart phones as well as telephones from time immemorial), can only be held *to one ear at a time*. Per the specification, "location of sound and/or a direction to the sound can be altered or created using one or more of head-related transfer functions (HRTFs), accounting for differences in arrival times *between the ears* (interaural time differences)[.]" *Id*. at 3:59-62 (emphasis added).

The '737 Patent offers the following instructive definition at 64:57-65:3: "As used herein, a "telephone call" or "phone call" is "a connection over a wired and/or wireless network between a calling person or user and a called person or user." (Emphasis added). This definition does **not** include the word "phone." The specification goes on to say that "[t]elephone calls ***can*** use landlines, mobile phones, satellite phones, HPEDs, voice personal assistants (VPAs), computers, and other portable and non-portable electronic devices." (Emphasis added). Again, there is no requirement that the telephone call uses a phone.

The specification also provides specific examples of ***other*** types of calls, namely "Voice over Internet Protocol (VoIP) calls, internet telephone calls, in-game calls, telepresence, etc." *Id.* This is of particular importance because the Oculus Quest headsets (which Meta insists are *not* telephones) are indeed capable of at least VoIP calls and in-game calls. *See* Ex. 1 (a Meta-produced guide on how to implement VoIP on a Quest Headset). To further illustrate this point, multiple embodiments of the specification clearly illustrate that an "electronic phone call" and "telephone

call" do not require a phone. Instead, the parties communicate over an electronic network utilizing a variety of different electronic devices. The '090 Patent bears this out repeatedly, for example at 5:32-44: "Consider an example in which a listener sits at his kitchen table and has an electronic telephone call with his mother. Both the listener and the mother wear electronic devices in or near their ears that capture, transmit, and provide sound for the telephone call." (Emphasis added). Another illustration exists at 11:52-55: "Consider an example in which a first person and a second person engage in an electronic telephone call in which both people wear headphones with speakers and microphones to capture and transmit binaural sound." (Emphasis added).

Additionally, Fig. 20 of the '090 Patent clearly shows a user 2020 wearing a wearable electronic device (WED) 2015 on his/her head "during a telephone call" (*see* 32:30). In yet another example, Fig. 21 shows a user wearing a WED 2120 that displays virtual images and provides an SLP in empty space during a "telephone call" (*see* 33:57 and 34:3). Again, none of these exemplary embodiments require a phone. Requiring a phone in the claim construction **would exclude example embodiments of the invention *expressly taught* in the specification**. Further, no evidence exists that the patentee made any arguments during prosecution that would warrant excluding these example embodiments from the claims reciting "electronic phone call" and "telephone call."

These intrinsic citations support Plaintiff Eight kHz LLC's ("8kHz") construction of "voice communication over an electronic network between at least two parties." The relevant specifications provide multiple examples (as shown herein) describing a conversation between at least two people using electronic devices, which necessitate the use of an electronic network. This intrinsic evidence is superior to extrinsic dictionary definitions of "phone call" and "telephone call" claim terms put forth by Defendants. However, even if extrinsic evidence is considered by the Court, *it also supports Plaintiff's construction*. For example, the New Oxford American Dictionary

(2005) defines "phone" as "a speech sound" or "denoting an instrument using or connected with sound," and "telephone" as "a system that converts acoustic vibrations to electrical signal in order to transmit sound, typically voices, over a distance using wire or radio." Ex. 2, 1278 and 1735. These definitions are in strong alignment with Plaintiff's constructions. Defendants' insistence on the inclusion of the word "phone" is wrong in view of the intrinsic and extrinsic evidence.

2. The enumerated terms are equivalent.

The claims and specification of the '090 Patent regard all of the terms equally and generically, and do not discriminate among them. "No specific definition of each of the terms exists in the intrinsic record to suggest the terms are not interchangeable, so the "evidence [and context of the terms] indicates that the patentee used the [three] terms interchangeably." *Haddad v. United States*, 164 Fed. Cl. 28, 67 (2023), citing *Baran v. Med. Device Techs., Inc.,* 616 F.3d 1309, 1316 (Fed. Cir. 2010) (emphasis added). As is the case here, "[w]hen viewed within context, a skilled artisan would know the scope of the claimed invention with reasonable certainty—these . . . refer to the same output and are interchangeable." *Id.*; *see also* Ex. 7, Begault Decl. ¶8.

For example, at 8:7-8, the '090 Patent states "[c]onsider a third scenario in which Paul travels to another country and initiates ***a call*** with John." (Emphasis added). Thus, the prefixes of "telephone," "electronic," and "electronic telephone" are irrelevant, as an embodiment of the patent is described without using any of them. Likewise, at 11:52-55, an "electronic telephone call" is described. Later in the same paragraph, and *while discussing the same call*, the phrase "***the telephone call***" is used. (Emphasis added). This shows that at least "electronic telephone call" and "telephone call" are used interchangeably. Additionally, at 32:49-54 there is a discussion of Fig. 21 and people that "communicate during an ***electronic call***" and a Sound Localization Point (SLP). Later, at 33:55-64, there is a discussion referring to SLPs concerning the same Fig. 21 that states "an ***electronic telephone call***." This demonstrates that at least "electronic call" and "electronic

telephone call" are equivalent to each other. Plaintiff's proposal for plain and ordinary meaning should be adopted. But, if the Court requires a construction, Plaintiff's proposals as detailed above should be adopted because the word "phone" is not required, and because the three claim terms are equivalent. Ex. 7, Begault Decl. ¶7.

B. "away from and proximate to"

Claim Term	8kHz's Construction	Defendants' Construction
"away from and proximate to" '090 Pat., cls. 8, 14, 15; '196 Pat., cls. 1, 4, 15, 19.	Ordinary and customary meaning, but if the Court requires a construction, "a distance from"	Indefinite.

The Court should apply the ordinary and customary meaning, or if necessary, adopt 8kHz's construction as it stays true to the meaning of the term as used in the claims and intrinsic record. Defendants' assertion that "away from and proximate to" is indefinite is wrong.

Patent claims describe the invention scope. *Sonix Tech. Co.. v. Publications Intl.*., 844 F.3d 1370, 1377 (Fed. Cir. 2017). But this requirement is not unnecessarily exacting. The patent statute appreciates the "delicate balance" between "the inherent limitations of language" and providing "clear notice of what is claimed." *Sonix Technology Co., Ltd. v. Publications International, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017) (*quoting Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 909 (2014)) (internal citations omitted). "[T]he certainty which the law requires in patents is not greater than is reasonable, having regard to their subject-matter." *Id*.

Viewed in light of the associated claims and specifications, the term "away from and proximate to" is clear to a PHOSITA, but in any case, would be no less than "a distance from." Ex. 7, Begault Decl. ¶¶9-11. In the context of spatial audio, a PHOSITA would understand that the phrase "away from" describes a sound that is "externalized," that is, localized at a distance "outside-the-head," as distinct from a sound that is located "inside of" the head of a listener. Id. ¶9. 10; *see*

also '090 1:6-15, 38:34; '196 1:7-16, 38:34; '628 1:7-16, 39:19 (describing the issue that monophonic and stereophonic sound is not the equivalent to proximate, face-to-face communication and also describing the "inside the head" creation of sound). The phrase "proximate to" clearly modifies the extent of the distance at which an externalized (outside-the-head) sound is intended to appear. Two persons having a conversation at a normal sound level within the same room are proximate to one another, as opposed to communication between two persons over a long distance, say 20 or more feet, which might require a raised voice or shouting. *Id.* ¶10. For example, claim 1 of the the'196 Patent is directed to movement of a sound localization point (SLP) of a voice of a computer program. The claim describes an "earphone … located at a head of the user," providing "binaural sound to the user … such that the origin of the voice of the computer program occurs at the SLP at a first location in empty space that is away from and proximate to the user." '196 Patent, cl. 1. Based on this claim, the voice from the SLP is located in empty space, outside the head of the user. Defendants' expert agrees, at least to an understanding of the phrase "away from" as used in the context of spatial audio, that this means outside the head of a person. Ex. 3, McMullen Tr. at 193:1-8.

The specifications further support the conclusion that the SLP is a distance from the user because the origin of the SLP is described by its relationship to the listener, as away from the listener—such as in empty space—and thus not at the same location as the listener. '090 and '196 Patents at 4:30-40. Further, the SLP is ***described in terms of the point-of-view of the listener*****, where this point-of-view may be *proximate***, such as in the same room. *Id*. To the patentee and a PHOSITA, when the SLP is in empty space not at the head of the user, but in the same room as the user, it is simply a distance from the user because, as the patent explains, the "listener of the detected sound can localize the sound to determine a distance and direction of the sound." *Id*. at 3:33-38.

This association between a SLP that is a distance from, and in the same room as the listener is further clearly represented in several patent figures, such as the sound localization point 1850 in room 1860, where it is shown as a distance from the listener 1810 as the listener moves from location 1 to location 2. *Id.* at Figure 18; 31:21-31. The specification provides these, and other examples describing and showing that the meaning of "away from and proximate to" a user as used in the claim is where there the SLP is "a distance from" a listener.

The '090 and '196 Patents were issued without office actions as the USPTO did not view the term "away from and proximate to" as being defective in view of Section 112.[1]

8kHz's proposal for ordinary and customary meaning should be adopted. The term "away from and proximate to" ***simply indicates that the SLP must be outside of the user's head but in a vicinity as exemplified in the claims and specifications***. But, if it is believed there is difficulty interpreting meaning of the phrase "away from and proximate to," its understanding is resolved by the claim itself and the supporting specifications and figures. Therefore, if the Court requires a construction, 8kHz's proposal of "a distance from" should be adopted because it stays true to the invention.

In arriving at a conclusion that the disputed term is indefinite, Defendants fail to evaluate the disputed term in view of the claims and specifications as a whole and exact far too much precision on the disputed term than is necessary to understand the scope of the invention. This is legal error and falls short of proving the disputed term is indefinite. *Maxell, Ltd. v. Amperex Tech. Ltd.*, No. 6:21-cv-00347, 2022 WL 16858824, *15-16 (W.D. Tex. Nov. 10, 2022) ("Indefiniteness must be proven by clear and convincing evidence."). Defendants first conclude the claims do not

[1] Dr. McMullen's Decl. indicates she reviewed the prosecution histories (¶ 149), but in her deposition she stated she did not search the prosecution histories for Section 112 rejections (McMullen Tr. at 167:5-24).

offer any guidance on the meaning of the disputed term, taking only a snapshot of the disputed term in the context of claims 8 and 14 of the '090 Patent, and in doing so, fail to analyze use of the term in the claim as a whole. Dkt. 83 at 6. As shown above, a reading of the applicable claims provides enough context for a PHOSITA to easily understand the meaning of the disputed term.

Defendants' incomplete analysis is used to arrive at the unsupported premise that the term provides "two seemingly contradictory conditions occurring in parallel." *Id*. Defendants then shop the specifications for confirmation of the contradictions, picking up the notion that some specific distances or objective boundaries must be identified to resolve the contradiction, and since none were found, the claims and disclosures do not provide requisite "reasonable certainty." *Id*. at 6-7.

Failing to properly evaluate the claims and specifications, Defendants conclude by returning to their position that the term is inconsistent, relying heavily on dictionary definitions in arriving at this conclusion. *Id*. at 7-8. But reliance on dictionary definitions is misplaced as Defendants failed at the outset to fully evaluate the claims and the specification before resorting to extrinsic evidence. *Brookhill-Wilk 1, LLC v. Intuitive Surgical, Inc*., 326 F.3d 1215, 1220 (Fed. Cir. 2003) ("While dictionaries and treatises are useful resources in determining the ordinary and customary meaning or meanings of disputed claim terms, the correct meaning of a word or phrase is informed only by considering the surrounding text."); *Endo Pharms. Inc. v. Watson Lab'ys, Inc*., No. 2:13-CV-192-JRG, 2014 WL 2859349, at *3 (E.D. Tex. June 23, 2014) (characterizing dictionaries as "subordinate to the intrinsic record"). And, relying too heavily on dictionaries as absolutely determinative of the meaning of a word invites error. *Brookhill-Wilk 1*, 334 F.3d at 1300.

The foregoing shows Defendants' conclusions are wrong, and the term "away from and proximate to" as used in the asserted claims of the '090 and '196 Patents is understandable in view

of the claims and specifications, and should be given its ordinary and customary meaning; but if necessary, construed as "a distance from," staying true to the claims, specifications, and invention.

C. "a binaural voice"

Claim Term	8kHz's Construction	Defendants' Construction
"a binaural voice" '090 Pat., cl. 15.	Ordinary and customary meaning, but if the Court requires a construction "a binaural sound"	"vocal sound waves as they would be received by each of the left and right ears of a listener, which a listener can localize"

Plaintiff asserts that this term does not require construction as it should be given its plain and ordinary meaning. Indeed, the meanings of "binaural" and "voice" have well-understood meanings to a PHOSITA. Ex. 7, Begault Decl. ¶12. However, if the Court construes this term, Plaintiff agrees with Defendants' proposed construction but with a simple tweak: to add "representation of" before the beginning of Defendants' proposed construction. Although Plaintiff originally proposed a "backup" construction of "binaural sound," Plaintiff believes that an alternative construction with Defendants' language but prefaced by "representation of" not only makes it clear to the Court where the dispute lies, but also shows the deceptiveness of Defendants' stance. In Defendants' attempt to eliminate from the definition of "voice" any *representation* of vocal sound waves, they ignore the fact that the patent is not about – much less restricted to – vocal cords or "vocal sound waves" but transmission of a ***representation*** of vocal sound waves.

"Binaural voice" is a clear example of a term that should be given its ordinary and customary meaning, which is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (citations omitted). "There is a heavy presumption that claim terms are to be given their ordinary and customary meaning." *Aylus Networks, Inc. v. Apple Inc.*, 856 F.3d 1353, 1358 (Fed. Cir. 2017)(citations omitted). This is the simplest of terms with only two words: "binaural" and

"voice." Contrary to Defendants' assertion, "binaural" is a basic term that a PHOSITA would clearly understand. Ex. 7, Begault Decl. ¶ 12 The word has two parts: "bi" meaning "two," and "aural" meaning "of or relating to the ear or to the sense of hearing." Ex. 4, Meriam-Webster's Collegiate Dictionary (2003). Even regular (non-technical) dictionaries define "binaural" and do so as "of or related to sound **reproduction** involving the use of two separated microphones and two transmission channels to achieve a stereophonic effect." Ex. 5, Webster's All-In-One Dictionary (emphasis added). This follows from the basic BI + AURAL combination. Lay people understand this, and certainly so would a PHOSITA. Defendants' expert analogized lay understanding of "binaural" with "binoculars" (but then speciously concluded that it was a "very specialized term"). Ex. 3, McMullen Tr. at 78:2-7.

The word "voice" is even a simpler term. Only patent litigators would feign ignorance of this common everyday word, and two normal everyday words together do not a mystery create. Here, a "binaural voice" is the simplest of terms and does not require construction. The fact that Defendants cite multiple technical dictionaries which say the same thing clearly shows that a PHOSITA would understand the term. However, in their proposed construction, Defendants attempt to unreasonably limit "voice" to exclude a ***representation*** of vocal sounds. As noted above, even the non-technical dictionary definition of "binaural" recognizes that the term is "of or related to sound ***reproduction***." Ex. 5 (emphasis added). Further, even Defendants admit that this is a reproduction of sound waves when they assert that "["binaural"] is routinely used to describe sounds that ***mimic*** how a listener would ordinarily hear sounds." Dkt. 83 at 9 (emphasis added). Although certainly a "binaural voice" ***can*** include actual "vocal sound waves," it is not ***limited*** to such. Indeed, a dictionary cited in Defendants' brief, Wiley Electrical and Electronic Dictionary (2004) at 844 notes that "voice" can mean "**[s]imulation** of a voice through the use of a device

which incorporates a speaker and computer" and can specifically mean "[a]ny **sound** *resembling* a voice." Ex. 6 (emphasis added).

The Summary of the Invention of the '090 Patent at col. 2, ll. 44-46 states "[t]he computer system positions a voice of one person at a sound localization point that is proximate to the other person." Clearly, this does not require forcing a person's vocal cords into a computer. Instead, it means a representation (e.g., electronic) of "vocal sound waves." This is evidenced throughout the specification. For instance, at col. 4. ll. 9-12, "[a]s another example, a speaking person could set the sound localization of his **transmitted voice** to a point within the reference frame of the listener, six inches from the face of the listener." (Emphasis added). A transmitted voice is not limited to sound waves emanating directly from vocal cords. Although the *originating source* may be vocal cords, the title of the patent is "Sound Localization for an Electronic Call," which necessarily requires transmission of a **representation** of vocal sound waves because neither vocal cords nor *actual* "vocal sound waves" can pass through the electronics which are the subject of the '090 Patent and its claims. Also col. 5, ll. 7-11 states "[a] listening person **wears earpieces with speakers in each ear** and **hears a voice** of the talking person originating from a point that is ten feet to one side of the listening person at a height equal to a height of the listening person." Clearly this is referring to a representation of sounds waves originally formed as vocal sound waves, but that are now representations of such sound waves. And at col. 5, ll. 40-42 the '090 states that "during the telephone call, the **voice of the mother** appears to originate from the empty kitchen chair such that the listener localizes her voice to this location." This means that a telephone call transmits not vocal cord vibrations, but rather an electronic or other representation of those vocal cord vibrations. Other similar examples run throughout the specification. Finally, Figures 3, 6, and 9 the '090 Patent refers to an "origin of [the/a] voice" six times. Patentee also used this "origin" language throughout the

specification of the '090 Patent at, *inter alia*., col. 5, ll. 40-42; col. 8, ll. 31-33; col. 9, ll. 18-21, 30-39, 48-53; col. 13, ll. 25-28, 35-42, 50-54; col. 18, ll. 54-60; col. 21, ll. 9-13; col. 32, ll. 31-34, 37-40; col. 37, ll. 46-49; and col. 39, 3-16. Although this "origin" means the location of the voice, if the patentee specifically wanted to limit claim 15 to the "origin of a voice" and not include representations of a voice as Defendants argue, it could have used the "origin" language it uses elsewhere in the patent. Clearly the patentee did not disavow a ***representation*** of a voice, and so the construction should not be limited as Defendants assert. *See Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014).

Defendants ask not to just ignore but also *exclude* the preferred embodiment of a *representation* of a voice notwithstanding the foundational patent law edict that "[a] claim construction that excludes a preferred embodiment is rarely, if ever correct and would require highly persuasive evidentiary support." *Epos Technologies Ltd. v. Pegasus Technologies Ltd*., 766 F.3d 1338, 1347 (Fed. Cir. 2014) (cleaned up); *see also Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996). Here, the only reason Defendants wish to unreasonably limit "binaural voice" to "vocal sound waves" is to improperly avoid infringement. The specification clearly uses the term "voice" to <u>include</u> a ***representation*** of "vocal sound waves." In fact, the title of the patent, "Sound Localization for an Electronic Call" clearly indicates that *representations* of sounds waves are required because an "***electronic*** call" does not include the transmission of actual sound waves, but rather a representation.

Neither a juror nor a PHOSITA would understand that a "voice" in a patent relating to "Electronic Call[s]" should be limited to sounds coming directly from vocal cords, especially when the title and the rest of the specification makes clear that a "voice" including a "binaural voice" is not so limited. Further, "voice" should not be limited to a human voice or to spoken words. For

instance, other animals than humans have "voices." When a cat meows, we often say that they are being "vocal." Many vocal sounds are not, in fact, speech, such as a whistling sound or a "shhh" sound for "quiet" that are used in communication. A PHOSITA would recognize the wide range of possibilities for the meaning of a "voice" from fields such as music sound synthesis, where a voice refers to the timbre or continuous stream of an auditory element, such as the tones produced by one of multiple sound oscillators; non-speech voices can come from animals, including birds that can mimic human speech. Ex. 7, Begault Decl. ¶12.

As such, no construction is needed for "binaural voice," but if the Court disagrees, it should construe the term as "representation of vocal sound waves as they would be received by each of the left and right ears of a listener, which a listener can localize" or alternatively, a "binaural sound."

D. "head related transfer functions" / "HRTFs"

Claim Term	8kHz's Construction	Defendants' Construction
"head related transfer functions" / "HRTFs" '628 Pat., cls. 9, 12, 16; '737 Pat., cls. 1, 14, 15, 16; '179 Pat., cl. 14; '184 Pat., cl. 14; '836 Pat., cls. 8, 10.	Ordinary and customary meaning, but if the Court requires a construction, "functions that describe transformation of sound that modify the spectrum and time of arrival at a listener's ears".	Plain and ordinary meaning, which is "functions of frequency and three spatial variables—distance, azimuth angle, and elevation angle—that represent how sound reaches the ears of a listener".

Both parties assert that "head related transfer functions" ("HRTFs") does not require construction as it should be given its ordinary and customary meaning. However, if the Court requires construction, Plaintiff believes "functions that describe transformation[s] of sound that modify the spectrum and time of arrival at a listener's ears" is consistent with both the specifications of the Patents-in-Suit and understanding of a PHOSITA. *See* Ex. 7, Begault Decl. ¶13 (defining HRTFs as "the transformations responsible for modifying the spectrum and time of arrival of sound at each of a listener's ears").

The Patents-in-Suit introduce HRTFs as functions that "describe how a sound wave changes as it interacts with the torso, head, and pinnae of the listener." '826 Patent at 2:24-26. The Patents-in-Suit teach that HRTFs can be used to reveal modifications made to the sound perceived by a listener. *See, e.g.*, '628 Patent at 26:35-42 ("These HRTFs describe the time delays, amplitude, tonal transformations, etc. for given azimuth and elevation angles. A sound impulse captured at the talking person has a set of HRTFs, and this sound impulse captured at the listening person has a set of HRTFs. A comparison of these sets of information reveals what changes were made to the sound impulse by the anatomy of the listening person."); '090 Patent at 25:67-26:8 (same). Thus, the Patents-in-Suit provide ample support for Plaintiff's construction that HRTFs merely describe transformations of sound.

As to the kind of transformations described by HRTFs, the Patents-in-Suit specifically provide HRTFs describe modifications made to original binaural sound to account for both the spectrum and time of arrival at a listener's ears. *See, e.g.*, '179 Patent at 3:4-17; '184 Patent at 3:4-17 (same). The Patents-in-Suit are clear that HRTFs do not transform the sound by and of themselves—HRTFs merely describe how the original sound is spectrally and/or temporally modified:

> The complex and unique shape of the human pinnae transforms sound waves through spectral modifications as the sound waves enter the ear. These spectral modifications are a function of the position of the source of sound with respect to the ears along with the physical shape of the pinnae that together cause a unique set of modifications to the sound called head related transfer functions or HRTFs. A unique pair of HRTFs (one for the left ear and one for the right ear) can be modeled or measured for each position of the source of sound with respect to a listener.

'836 Patent 28:42-51; *see also* '090 Patent at 3:55-67 ("providing that HRTFs account for, *inter alia*, "differences in arrival times between the ears (interaural time differences)" and "differences in amplitude or level of the sound between the ears (interaural level differences)"). Therefore, Plaintiff's proposed construction is fully supported by the specifications of the Patents-in-Suit.

Defendants' position as to construction of HRTFs is evasive. On one hand, they agree with Plaintiff that HRTFs must be given plain and ordinary meaning. But then Defendants propose an overly restrictive construction by defining HRTFs as "functions of frequency and three spatial variables." Defendants' proposed construction is erroneous for three reasons, and the Court should reject it. *First*, Defendants' proposed construction, if accepted, would essentially read limitations, that is, "three spatial variables," from the specification into the asserted claims. This is improper under the Federal Circuit's well-entrenched precedent. *See, e.g.*, *Arlington Indus., Inc. v. Bridgeport Fittings, Inc.*, 345 F.3d 1318, 1327 (Fed.Cir.2003); *Gart v. Logitech, Inc.*, 254 F.3d 1334, 1343 (Fed.Cir.2001).

Second, Defendants gloss over the express language of the specifications and several examples provided therein where HRTFs were calculated by less than three variables. *See, e.g.*, '737 Patent at 39:25-35 ("providing that HRTF coordinates "can include a distance (R) or near-field or far-field designation, an azimuth angel (θ), ***and/or*** an elevation angle (φ)."); '628 Patent at 28:63-29:3 (providing that in the far-field, HRTF is only a function of frequency and two spatial variables, that is, H(f, θ, φ), as opposed to H(f, r, θ, φ)). Instead, Defendants pluck a single statement out of a specification but ignore many others to support their narrow construction. This is improper. This Court should not "countenance the importation of claim limitations from *a few specification statements* or figures into the claims." *Computer Docking Station Corp. v. Dell, Inc.*, 519 F.3d 1366, 1374 (Fed.Cir.2008) (emphasis added).

Further, Defendants' proposed construction does not comport with a PHOSTIA's understanding of HRTFs in light of the specifications. For one, the notion that HRTFs "represent how sound reaches the ears of a listener" is patently false, because HRTFs are only one factor that contributes to the listener's perception of sound. Ex. 7, Begault Decl. ¶13(1). The Patents-in-Suit

teach that many factors other than HRTFs are responsible for how a listener perceives sound, including sound intensity and the head orientation of the listener with respect to the origin of the sound. *See, e.g.*, '628 Patent at 7:45-56, Ex. 7, Begault Decl. ¶13(1). HRTFs merely account for sound modifications brought about by "complex and unique shape of the human pinnae." *See, e.g.*, '737 Patent at 39:36:45. For another, Defendants' restrictive construction connotes that calculation of HRTFs with less than three variables is a practically impossible. Not so. Ex. 7, Begault Decl. ¶13(2).

Third, Defendants' own expert admitted under oath that Plaintiff's proposed construction is accurate, because "HRTFs are really hard to measure because it ***describes the entire***, you know, ***transformation of sound*** at lots of different locations around a user." Ex. 3, McMullen Tr. 87:10-12 (emphasis added), *see also id.* at 29:9-17 (providing that HRTFs "characterizes" the transformation that needs to happen to the sound). Dr. McMullen further admitted that HRTFs are essentially "mathematical representation of the transformation." *Id*. at 209:15-16.

The absurdity of Defendants' complaint that the specifications omit a spelled-out HRTF mathematical function can be illustrated through the lens of Texas barbecue. If a brisket recipe directed the use of one's favorite 'dry rub,' a Texas reader would not need to be told that the rub includes some proportion of salt, pepper, or other spice. It would be even more absurd if the intended audience for the recipe were professional competitors. Likewise, HRTFs are well-known to a PHOSITA—even Defendants' own expert declined to spell-out the math for an HRTF in her own white paper (directed to presumably the same audience). Ex. 8, McMullen Audio Engineering Society Convention Paper (2012). Instead, she merely stated that "[t]o implement this approach [to convolve sound], the audio engineer [an example of a PHOSITA] requires a database of HRTFs, many of which are free and publicly available." *Id.* at 2. In her own writings, she acknowledges that

a PHOSITA would select from available, well-known database of HRTFs, the mathematical function that best met her needs—she would not need the math spelled out in granular detail any more than a professional barbecue competitor at the Texas State Fair would need to be told that a dry rub includes salt.

For these reasons, Defendants' position should be rejected, and the Court should give the term "head related transfer functions" its plain and ordinary, or in the alternative, adopts Plaintiff's proposed construction.

E. "digital signal processor" / "DSP"

Claim Term	8kHz's Construction	Defendants' Construction
"digital signal processor" / "DSP" '836 Pat., cls. 8, 10; '179 Pat., cl. 14; '184 Pat., cl. 14.	Ordinary and customary meaning, but if the Court requires a construction "specialized processor or software optimized for transforming an input signal at its output".	"specialized processor with better power performance and efficiency than a general purpose microprocessor"

The Court should adopt the ordinary and customary meaning of "digital signal processor" ("DSP"), but if the Court requires a construction, a DSP is a "specialized processor or software optimized for transforming an input signal at its output." Ex. 7, Begault Decl. ¶14. The parties agree that a DSP is a "specialized processor" proven by the intrinsic evidence, but Defendants' proposed construction of "specialized processor with better power performance and efficiency than a general-purpose microprocessor" is misplaced. Defendants first choose to rely on a "soundbite" snippet from the specification, then revert to misleading extrinsic evidence to support this inadequate construction[2].

[2] Defendants quoted "a DSP has a better power performance or power efficiency compared to a general-purpose microprocessor" for their erroneous argument that a DSP is defined by its power performance and efficiency compared to a general-purpose microprocessor. '836 Patent at 39:10-14. However, 39:7-10 reads, "Consider an example in which the HPED includes a customized or

Defendants' proposed construction emphasizes power consumption and efficiency (which are ancillary benefits of a DSP) and ignores function, which would confuse, mislead, and completely side-step a PHOSITA's normal understanding of what a DSP is. While it might be true that a DSP *could* have better power performance than a general-purpose microprocessor, that is hardly a complete and accurate description or definition of a DSP. Nowhere does the '090 Patent state that a DSP *must* have "better power and performance and efficiency than a general-purpose processor." Nothing in the file history supports reading this limitation into the term DSP. Instead, the specification repeatedly states the DSP is an example of one or more processors that can convolve sound. *See, e.g.* '737 Patent at 58:44-49 and '836 Patent at (4:26-29, 27:34-27:43, 31:34-37, and 39:4-7). Plaintiff's proposed construction of "specialized processor or software optimized for transforming (e.g. convolving) an input signal at its output" is much broader and more understandable for both a jury and a PHOSITA.

The specification states that the DSP is an example of a processor that is "*optimized* for *convolving sound* and executing one of more example embodiments." '737 Patent at 58:44-49. (Emphasis added). Plaintiff's proposed construction correctly focuses on the specific function the DSP performs, rather than secondary features that do not define what a DSP is. For example, DSPs can be configured to improve or optimize one or more features, and the specification even sets forth some of these potential features (e.g., "increase execution speed and sound processing efficiency" or "lower-cost solution"). *See* '737 Patent at 58:57-59:3. But the specification does not require these features, nor does it suggest that these features define a DSP. Instead, the DSPs discussed in the

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dedicated DSP… Such a DSP has a better power performance …" Thus, the specification is merely providing an example wherein a customized DSP is used to execute the functions described in the patent. with better power and performance. Defendants' attempt to utilize this embodiment is misleading and confers additional meaning to a general DSP.

Patents-in-Suit continuously relate to specialized processors that optimize the function of *convolving sound*, regardless of efficiency or power performance.

Importantly, when the DSP convolves or processes sound, it is a form of transformation. *Id.* at 24:1-4 ("[A] digital signal processor (DSP) or other processor convolves and/or processes the sound so it externally localizes as binaural sound away from the user to the designated location that is in 3D space."). The specification provides examples of when a DSP transforms an input sound (such as a sound file), to create the convolved (transformed) sound. For example, the input can be an "audio file with HRTFs of the listener." *Id.* at 11:51-53 ("A digital signal processor (DSP) convolves the audio file with HRTFs of the listener so the sound localizes as binaural sound to the designated SLP."). Therefore, DSPs inherently transform an input signal at its output (convolving sound).

Defendants rely on misleading extrinsic evidence to support their proposed construction. For instance, Defendants cite the Comprehensive Dictionary of Electric Engineering, defining "digital signal processor" as a "microprocessor specifically designed for processing digital signals. DSPs are typically well suited to perform multiplications and additions in chain, even floating in point. They are less suitable for managing interrupts and large amounts of memory." Dkt. 83 at 16. At best, this description provides overly broad insight to the functions that a DSP may perform and functions that are "less suitable." Determining whether a DSP is better or worse than a general-purpose microprocessor, however, fails to describe a DSP in a way for a jury or PHOSITA to understand. It is a relative definition and would only introduce confusion to the jury. Defendants' reliance on misleading extrinsic evidence is legal error. *CloudofChange, LLC v. NCR Corp.*, No. 6-19-CV-00513-ADA, 2020 WL 4004810, at *2 (W.D. Tex. July 15, 2020) ("Technical dictionaries may be helpful, but they may also provide definitions that are too broad or not indicative of how

the term is used in the patent."); *see also Brookhill-Wilk 1, LLC v. Intuitive Surgical, Inc.*, 326 F.3d 1215, 1220 (Fed. Cir. 2003); *Endo Pharms. Inc. v. Watson Lab'ys, Inc.*, No. 2:13-CV-192-JRG, 2014 WL 2859349, at *3 (E.D. Tex. June 23, 2014).

In fact, extrinsic evidence suggests that a PHOSITA does not describe a DSP by differentiating a DSP by its power efficiency, but rather by the functions DSPs are optimized to perform. Defendants' own technical expert agrees with Plaintiff's construction. Ex. 3, McMullen Tr. at 163:19-21 ("DSPs mostly have their claim to fame because they've been *optimized* to perform lots of different kinds of mathematical *functions*"); *id.* at 163:25-164:2 ("DSPs are *specialized* to perform certain operations, like mathematical operations, quickly") (emphasis added). It would be improper to explain a DSP to a jury in a manner that deviates from a PHOSITA's understanding. Rather, a DSP should be regarded as the function it performs and within Plaintiff's proposed construction of a specialized processor "optimized for transforming an input signal at its output." Ex. 7, Begault Decl. ¶14.

While Plaintiff's proposed construction is consistent with intrinsic evidence, it is also consistent with extrinsic evidence, including a dictionary cited by Defendants. Ex. 9, Wiley Electrical and Electronics Engineering Dictionary (2004) at 192 (defining "digital-signal processing," as "[t]he *processing* of analog information which has been converted into digital form.") (emphasis added). Note that this definition does not limit a DSP to be implemented only in chip form (although this is the most typical approach). Further extrinsic evidence also supports this idea: "a DSP can also be implemented in software within the native CPU." Ex. 7, Begault Decl. ¶7. The key principle that a PHOSITA understands is that the DSP is either a specialized circuit or a software module that receives an input signal, transforms it, and outputs the transformed signal. This is additionally reflected in the definition provided by Ex. 15 Barron's Business Guides

Dictionary of Computer and Internet Terms (2017) at 140 (defining "DSP" as "[t]he use of computers to process signals such as sound or video.") Whether the DSP is implemented in hardware or software, in view of the patents at issue, the output of the DSP is convolved sound.

Plaintiff's proposal for ordinary and customary meaning should be adopted. But, if the Court requires a construction, Plaintiff's proposed construction as stated above should be adopted.

F. "wearable electronic device" / "WED"

Claim Term	8kHz's Construction	Defendants' Construction
"wearable electronic device" / "WED" '090 Pat., cl. 15; '196 Pat., cls. 15, 19; '628 Pat., cls. 9, 12, 16; '179 Pat., cl. 14; '184 Pat., cl. 14; '509 Pat., cls. 9, 10, 17; '737 Pat., cls. 1, 14, 15, 16; '316 Pat., cls. 9, 10, 14.	Ordinary and customary meaning, but if the Court requires a construction "portable wireless electronic device that is worn on or attached to a person".	No construction is necessary.

Defendants propose no construction for this claim term. As shown above, the parties essentially agree that ordinary meaning applies, and the Court need not construe these claim terms.

G. "handheld portable electronic device" / "HPED"

Claim Term	8kHz's Construction	Defendants' Construction
"handheld portable electronic device" / "HPED" '196 Pat., cls. 1, 4; '737 Pat., cl. 1	Ordinary and customary meaning, but if the Court requires a construction "portable wireless electronic device that is held in the hand of a person".	No construction is necessary.

Defendants propose no construction for this claim term. As shown above, the parties essentially agree that ordinary meaning applies, and the Court need not construe these claim terms.

H. The "Processor" Terms Are Described with Sufficient Structure and Are Not Subject to Section 112(f).

Means-plus-function analysis consists of two steps. *Dyfan, LLC v. Target Corp.*, 28 F.4th 1360, 1365 (Fed. Cir. 2022). Step one asks if a claim limitation is in a means-plus-function format, "which requires us to construe the limitation to determine whether it connotes sufficiently definite structure to a person of ordinary skill in the art." *Id.* Section 112(f) does not apply to claim limitation not drafted in means-plus-function format. *Id.* Step two is only necessary if the limitation is drafted in the means-plus-function format, and step two consists of determining "what structure, if any, disclosed in the specification corresponds to the claimed function." *Id.* (quoting *Williamson v. Citrix Online*, LLC, 792 F.3d 1339, 1351 (Fed. Cir. 2015)).

1. Defendants Fail to Rebut the Presumption That Section 112(f) Is Inapplicable.

When a claim term lacks the word "means," a rebuttable presumption exists that Section112(f) does not apply. *Dyfan, LLC v. Target Corp.*, 28 F.4th 1360, 1365 (Fed. Cir. 2022) (citing *Williamson v. Citrix Online*, LLC, 792 F.3d 1339, 1348 (Fed. Cir. 2015)). To rebut that presumption, the challenger has the burden to demonstrate, by a preponderance of the evidence, that the words of the claim lack a sufficiently definite meaning as the name for the structure as understood by persons of ordinary skill in the art. *Williamson*, 792 F.3d at 1349; *Dyfan*, 28 F.4th at 1367. The challenger must demonstrate "that the claim term fails to [(1)] 'recite sufficiently definite structure' or else recites [(2)] 'function without reciting sufficient structure for performing that function.'" *Id.* (quoting *Watts v. XL Sys., Inc.*, 232 F.3d 877, 880 (Fed. Cir. 2000). A challenger's failure to carry the burden to rebut that presumption with adequate evidentiary support leaves the presumption intact. *See Zeroclick, LLC v. Apple Inc.*, 891 F.3d 1003, 1008 (Fed. Cir. 2018).

In determining if a claim limitation is subject to Section 112(f), it is necessary to determine whether persons having ordinary skill in the art would understand the words of the claim "to have sufficiently definite meaning as the name for structure." *Williamson*, 792 F.3d at 1348. Claim

limitations are not read apart in vacuums but using "traditional claim construction principles, on an element-by-element basis, and in light of evidence intrinsic and extrinsic to the asserted patents." *Zeroclick*, 891 F.3d at 1007; *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1296 (Fed. Cir. 2014). While the investigation into whether a claim limitation has sufficiently definite structure has analytical overlap with the second step of a means-plus-function analysis, it remains a distinct inquiry. *Apple*, 757 F.3d at 1296. Meanwhile, a "sufficiently definite structure" can be recited in the claim terms with a described class of structures and that does "not connote a single, specific structure." *Dyfan*, 28 F.4th at 1366 ("In *Apple,* we explained that structure can be recited in various ways, including through the use of 'a claim term with a structural definition that is either provided in the specification or generally known in the art,' or a description of the claim limitation's operation and 'how the function is achieved in the context of the invention.'") (quoting *Apple,* 757 F.3d at 1299).

Defendants have failed to introduce adequate evidence to rebut the presumption that Section 112(f) does not apply. Furthermore, the claim language discloses adequate structure and, in certain cases, discloses single, specific structure. Defendants' argument that Section112(f) applies is hinged on the notion that Plaintiff is relying solely upon the *Katz* exception, or that claiming a processor is somehow talismanic and immediately invokes the rigors of Section 112(f). *See* Dkt. 83 at 24-26.

CHART OF DISCLOSED STRUCTURE		
Claim	**Contested Structure**	**Disclosures Providing Definite Meaning Making Section 112(f) Inapplicable**
'090 Pat., cl. 15	"a processor"	• *Structure Identified:* "a central processing unit, CPU, microprocessor, application-specific integrated circuit (ASIC)" '090 Pat. at 41:20-23. • *Function Identified:* "adjust the binaural voice of the second person" *Id.* at 44:65-66.

		• *Relation to Other Structural Components Identified:* "The processing unit communicates with memory." *Id.* at 41:25-26; *see also* Fig. 26 (showing the processor in the overall device structure).
'196 Pat., cl. 15	"a processor"	• *Structure Identified:* "a central processing unit, CPU, microprocessor, application-specific integrated circuit (ASIC)" '196 Pat. at 41:20-23. • *Function Identified:* "move the SLP" and "provide binaural sound" *Id.* at 45:14-22. • *Relation to Other Structural Components Identified:* "The processing unit communicates with memory." *Id.* at 41:25-26; *see also* Fig. 26 (showing the processor in the overall device structure).
'196 Pat., cl. 19	"a processor"	• *Structure Identified:* "a central processing unit, CPU, microprocessor, application-specific integrated circuit (ASIC)" '196 Pat. at 41:20-23. • *Function Identified:* "change attenuation and reverberation of the binaural sound" *Id.* at 46:20-21. • *Relation to Other Structural Components Identified:* "The processing unit communicates with memory." *Id.* at 41:25-26; *see also* Fig. 26 (showing the processor in the overall device structure).
'628 Pat., cls. 9, 12	"a processor"	• *Structure Identified:* "a central processing unit, CPU, microprocessor, application-specific integrated circuit (ASIC)" '628 Pat. at 42:6-8. • *Function Identified:* "processing … a voice of the calling party with head related transfer functions (HRTFs)" *Id.* at 44:49-51. • *Relation to Other Structural Components Identified:* "The processing unit communicates with memory." *Id.* at 42:11-12; *see also* Fig. 26 (showing the processor in the overall device structure).
'628 Pat., cl. 16	"a non-transitory computer readable storage medium"	• *Structure Identified:* "These storage media include different forms of memory including semiconductor memory devices Such as DRAM, or SRAM, Erasable and Programmable Read Only Memories (EPROMs), Electrically Erasable and Programmable Read-Only Memories

		(EEPROMs) and flash memories; magnetic disks Such as fixed, floppy and removable disks; other magnetic media including tape; optical media such as Compact Disks (CDs) or Digital Versatile Disks (DVDs).” ‘628 Pat. at 42:51-61. • *Function Identified:* “storing instructions” *Id.* at 45:62-63. • *Relation to Other Structural Components Identified:* “Such computer-readable or machine readable medium or media is (are) considered to be part of an article (or article of manufacture). An article or article of manufacture can refer to any manufactured single component or multiple components.” *Id.* at 42:66-43:3; *see also* Fig. 26 (showing the processor in the overall device structure).
‘737 Pat., cls. 1, 14, 15, 16	“a processor”	• *Structure Identified:* “a central processing unit, CPU, microprocessor, microcontrollers, field programmable gate arrays (FPGA), application-specific integrated circuits (ASIC)” ‘737 Pat. at 58:9-12; 56:10-34 (explaining that sound localization also includes the use of a DSP). • *Function Identified:* “processing … sound with head-related transfer functions (HRTFs) to generate the binaural sound” *Id.* at 66:24-25. • *Relation to Other Structural Components Identified:* “The processing unit and DSP communicate with each other and memory” *Id.* at 58:16-17; *see also* Fig. 15 (showing the processor in the portable electronic device).
‘836 Pat., cls. 8, 10	“a processor”	• *Structure Identified:* “a central processing unit, CPU, microprocessor, microcontrollers, field programmable gate arrays (FPGA), application-specific integrated circuits (ASIC)” ‘836 Pat. at 38:33-36; 36:8-26 (explaining that sound localization also includes the use of a DSP). • *Function Identified:* “process sound . . . to generate binaural sound” *Id.* at 42:50-51. • *Relation to Other Structural Components Identified:* “The processing unit and DSP communicate with each other and memory” *Id.* at 38:40-41; *see also* Figs. 11, 12 (showing the processor in the portable electronic device)..

'836 Pat., cls. 8, 10	"a digital signal processor"	• *Structure Identified:* "with a hardware architecture optimized for convolving sound" '836 Pat. at 39:4-5; *see also id*. at 39:14-18; 36:8-26 (explaining that sound localization also includes the use of a DSP).. • *Function Identified:* "processes the sound . . . with head-related transfer functions" *Id.* at 42:57-58. • *Relation to Other Structural Components Identified:* "The processing unit and DSP communicate with each other and memory" *Id.* at 38:40-41 *see also* Figs. 11, 12 (showing the DSP in the portable electronic device).
'179 Pat., cl. 14; '184 Pat., cl. 14	"a digital signal processor"	• *Function Identified:* "processing … sound with the HRTFs to generate binaural sound" '184 Pat. at 48:1-2; 5:32-41 (using a DSP to filter/alter audio cues). • *Relation to Other Structural Components Identified:* "Sound localization system … includes or is in communication with a digital-to-audio converter (DAC), decompressor/decoder, digital signal processor (DSP), and includes hardware and/or software to process and localize sound to a SLP" *Id.* at 35:42-46.

Defendants improperly import an improper requirement that an algorithm must be disclosed to create sufficient structure in step one of a means-plus-function analysis without legal support.[3] *See Apple*, 757 F.3d at 1298 ("Hence, where a claim is *not drafted* in means-plus-function format, the reasoning in the *Aristocrat* line of cases does not automatically apply, and an algorithm is therefore *not necessarily required*." (emphasis added)). Defendants imply that when a claim does

[3] Defendants cite *Soque Holdings (Bermuda) Ltd. v. Keyscan, Inc.*, No. 3:09-cv-2651, 2010 WL 2292316, at *12 (N.D. Cal. June 7, 2010) in support of their contention. However, the California court in *Soque* erroneously relied up on *Aristocrat* in its §112(f) applicability analysis. *Compare id. with Apple*, 757 F.3d at 1298. *Aristocrat* only imposed the algorithm requirement after the parties had agreed that Section 112(f) applied. 521 F.3d at 1331.

not recite a function that is "coextensive" with a processor in compliance with the *Katz* exception,[4] the algorithm requirement for step one is imposed. *See* Dkt. 83 at 25, 26 n. 10. ("The 'Processor' terms do not recite simple, general purpose computing functions"). However, as *EON Corp. v. AT&T Mobility LLC* explains, the requirement to disclose an algorithm involving computer-implemented inventions sprouts when "the inventor ***has invoked*** means-plus-function claiming." 785 F.3d 616, 620-21 (Fed. Cir. 2015) (emphasis added) (quoting *Aristocrat Techs. Austl. Pty Ltd. v. Int'l Game Tech.*, 521 F.3d 1328, 1333 (Fed. Cir. 2008). By bootstrapping the rigid algorithm requirement into step one for a computer-implemented invention, Defendants ask this Court to nullify the purpose of step one and move straight to step two, obliterating any distinction between the two steps of a means-plus-function analysis. *Contra Apple*, 757 F.3d at 1296 ("[w]hile these two 'structure' inquiries are inherently related, they are distinct.").

Defendants' reliance on this inapplicable rule belies much of Dr. McMullen's Decl. regarding their Section 112(f) analysis. *See* Ex. 3, McMullen Tr. 171:7-25 (Question: "Do you know if there's any case law that's contrary to this principle of having to disclose and algorithm?" Answer "I don't know of any."). Many of Dr. McMullen's asserted structural deficiencies are predicated on the idea that sufficient structure must require the disclosure of an algorithm, or her technical ignorance regarding the recited structures. *See* Dkt. 83-11, McMullen Decl. ¶¶192, 212, 232, 255, 272, 296, 315. Often, functional recitations *help define* the structure as a description of structure's operation and will convey structural meaning to a PHOSITA. *See Linear Tech. Corp. v. Impala Linear Corp.*, 379 F.3d 1311, 1320 (Fed. Cir. 2004); *see also Apple*, 757 F.3d at 1299;

[4] As described in *EON Corp. v. AT&T Mobility LLC*, the *Katz* exception may excuse the requirement in step two for a disclosed algorithm wherein claiming a processor or microprocessor so long as the claimed function is "coextensive" with the processor itself. *EON*, 785 F.3d at 621-23.

Dyfan, 28 F.4th at 1366. Contrary to Dr. McMullen's assertion that the recited functions trigger finding indefiniteness of the recited structures, the recited functions provide additional definition as they recite audio processing functions like "processing with HRTFs." *See supra* Chart of Disclosed Structure. Reciting audio processing functions connote the additional structural meaning to a PHOSITA that the recited processors are of a class best suited for audio processing. *See Linear Tech.*, 379 F. 3d at 1320; Ex. 7, Begault Decl. ¶15.

Additionally, Dr. McMullen's analysis does not dedicate effort to explain why the provided charts and claim recitations explaining the interconnections with the "processors" and other hardware do not add structure nor why that additional structure does not help define that structure for a PHOSITA. Compare Dkt. 83-11, McMullen Decl. ¶¶190-329 with '090 Pat. Fig. 26; '196 Pat. Fig. 26; '628 Pat. Fig. 26; '737 Pat. Figs. 14-15; '179 Pat. Figs. 17-20; '184 Pat. Figs. 17-20; '836 Pat. Figs. 11-12. Rather, the basis for a lack of structure in all these disputed terms is described by Dr. McMullen as a lack of requisite detail in providing very detailed algorithms to a PHOSITA. *See* Dkt. 83-11, McMullen Decl. ¶¶197-207, 217-27, 237-50, 260-67, 280-92, 301-10, 320-29. As explained below by detailing all of the disclosed algorithms, Dr. McMullin not only reads each element out of context but also raises the disclosure standard wherein her conclusions are based in part on a perceived failure to disclose structures well-known to PHOSITAs, which is contrary to court precedent. *See Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1339-40 (Fed. Cir. 2016) (stating that sufficient structure does not require the disclosure of details well known in the art). Rather, she laments for each disputed term that it was necessary for the inventor to include the "numerous structures, algorithms, and processes that existed and were well known before the '[xxx] patent's earliest possible priority date" and proceeds to list the well-known structures and process. *See* Dkt. 83-11, McMullen Decl. ¶¶193, 213, 233, 256, 276, 297, 316. In essence, she answers her

own concerns as to how a PHOSITA would know what structures to use in the context of what structures are disclosed in the patents.

In the alternative, Defendants argue that "processor" or "computer readable storage medium" are *per se* nonce words giving them the talismanic property of applying Section 112(f) as soon as either are claimed. To make this leap, Defendants ask this Court to swim against the heavy current of Federal Circuit precedent. In *Zeroclick*, the Federal Circuit provided three warnings as it rejected district court rationale that (1) concludes that the incorporation of functional language "automatically convert words into means for performing such functions;" (2) removes the terms from their context; and (3) fails to make a pertinent finding that the disputed limitation is "used in common parlance as a substitute for means." 891 F.3d at 1008-09.

Like *Zeroclick's* first warning's rejected logic, Defendants conclusorily argue that "the claimed 'processor' is 'defined only by the function that it performs.'" Dkt. 83 at 24 (citing *St. Isidore Rsch., LLC v. Comerica Inc.*, No. 2:15-cv-1390, 2016 WL 4988246, at *14 (E.D. Tex. Sept. 19, 2016)). The only support Defendants cite is *St. Isidore*, and nothing more. Although *St. Isidore* found that "processor configured to" in the context of the patent it was construing lacked structure, that construction is inapplicable to this case. First, in accordance with *Zeroclick*, *St. Isidore* did not automatically convert "processor configured to" into a means because of functional claiming. No. 2:15-cv-1390 at *14; *see also Zeroclick.*, 891 F.3d at 1008. Rather, *St. Isidore* thoughtfully went through the specification and explained the lack of definite structure. *Id.* Second, the *St. Isidore* court found an arguably vaguer term, "transaction processing module", as sufficiently definite structure, further undermining Defendants' position that functional claiming automatically applies Section 112(f) to a term. No. 2:15-cv-1390 at *13. Furthermore, Defendants lump all the processor claims together, ignoring the fact that some claim terms name the specific structure of a "digital

signal processor" not simply a "processor," which they even acknowledged in their brief is a specific type of processor for audio processing. *See* Dkt. 83 at 16 n. 9 ("A digital signal processor is a specialized semiconductor device or specialized core . . . that processes very efficiently and in real time a stream of digital data that is sampled from analog signals ranging from voice, audio and video and from cellular and wireless to radio and television." (quoting Newton's Telecom Dictionary, (27th ed. 2013)); *see also* Ex. 7, Begault Decl. ¶¶15-16. This cannot be casually viewed as a "black box" that is merely defined by the function it performs when it is a well-known specific structure within the art for executing audio functions. Without explanation, this Court should not make the leap that "processor" is merely defined by the function it performs in the patents as Defendants request. *See* Ex. 7, Begault Decl. ¶15.

Defendants also run afoul of *Zeroclick's* second warning by repeatedly referring to "processor" outside of its context in the patent. Defendants make the conclusory statement that "the 'Processor' terms fail to recite sufficient structure" without any analysis of the accompanying claim terms or specification. Dkt. 83 at 26. Yet, in the cases cited by Defendants, the courts specifically analyzed each term in the context of the intrinsic record or provide no insight to their construction reasoning. Defendants improperly implore this Court to apply these holdings outside the context of the patents they were construing as proof that "processor" or "computer readable storage medium" *per se* lack structure. Defendants' neglect to undertake a thorough "examination and analysis of the claim language itself, as well as the specification that supports the various claims." *Compare* Dkt. 83 at 24-26 *with Joao Control & Monitoring Sys., LLC v. Protect Am.*, Inc., No. 1:14-cv-134, 2015 WL 4937464, at *9 (W.D. Tex. Aug. 18, 2015) (explaining that it read the claim terms in light of both the intrinsic and extrinsic evidence). In citing *WSOU Investments, LLC v. Google LLC* and *Arendi S.A.R.L. v. LG Elecs., Inc.*, Defendants conflate that those holdings are somehow applicable

given the inclusion of similar language, but in neither of those cases do the courts provide any explanation as to how they determined the disputed terms lacked sufficient structure. *See* Dkt. 83, Ex. F, *WSOU*, No. 6:20-cv-00574, Dkt. No. 48; *Arendi S.A.R.L. v. LG Elecs., Inc.*, No. CV 12-1595-LPS, 2019 WL 3891150, at *12 (D. Del. Aug. 19, 2019). Defendants, lacking evidentiary support from the record, have failed to carry their burden to rebut the presumption that Section 112(f) does not apply.

Finally, Defendants provide no evidence that "processor" when used in the common parlance of a PHOSITA is a substitute for "means" in conflict with *Zeroclick's* third warning. The Defendants make no factual argument that compels the Court to make such a determination. *See* Dkt. 83 at 24-26. Rather, Defendants argue that such a conclusion can be drawn from precedent. *Id.* However, the law cited by Defendants contradicts the idea that "processor" in its common parlance is a substitute for "means." In citing *WSOU*, Defendants hope to elevate "processor" to a talismanic symbol of insufficient structure. But the *WSOU* court did not consistently find that every claim containing "processor" was lacking structure. Ex. F, *WSOU Investments, LLC v. Google LLC*, No. 6:20-cv-00574, Dkt. No. 48 at 5, 7-8 (W.D. Tex. June 2, 2021) (construing several "processor" terms with their plain and ordinary meaning). Meanwhile, Defendants completely mischaracterize the Federal Circuits statements in *Apple Inc. v. Motorola, Inc*. *See* Dkt. 83 at 25. The parenthetical quote offered by Defendants is neither complete nor a holding of the court nor even mere dicta. *Compare* Dkt. 83 at 25 *with Apple*, 757 F.3d at 1298. Instead, Defendants cherry pick a statement midway through a description of the court's thought experiment. *Compare* Dkt. 83 at 25 *with Apple*, 757 F.3d at 1298. The correct standard from *Apple* is whether a "limitation has sufficient structure when it recites a claim term with a structural definition that is either provided in the specification or generally known in the art" as the court never subscribed to the idea that any word (other than

means) or lack thereof is dispositive. *Apple*, 757 F.3d at 1298-99 (explaining that imposing inappropriate structural requirements would result in the misapplication of 112(f)). Defendants have failed to make a pertinent demonstration that the disputed limitations are "used in common parlance as a substitute for means." *See Zeroclick*, 891 F.3d at 1009.

Even though Defendants have failed to carry their burden in rebutting the presumption that Section112(f) does not apply, Plaintiff notes that the disputed terms, when properly construed, have sufficiently definite structure. The disputed terms of the Patents-in-Suit, when read in light of the claim and specifications, disclose sufficiently defined structure. For the "processor" terms in the '090, '196, and '628 Patents, processor is described as a specific class of structures "such as a central processing unit, CPU, microprocessor, application-specific integrated circuit (ASIC), etc." *See* '090 Pat. at 41:20-22; '196 Pat. at 41:20-22; '628 Pat. at 42:6-8; *see also Dyfan*, 28 F.4th at 1366 ("Claim terms need not connote a single specific structure and may instead describe a class of structures and still recite sufficiently definite structure to not invoke §112 ¶6." (cleaned up)). Moreover, the '737, '836, and '179 Patents similarly define "processor" while adding "microcontrollers" and "field programmable gate arrays (FPGA)" and even describe custom ASICs. *See* '737 Pat. at 58:9-40; '836 Pat. at 28:33-64; '179 Pat. at 45:1-28; '184 Pat. at 45:1-4.

Structure-connoting terms paired with descriptions of their operation can convey to PHOSITAs sufficient structural meaning. *See Linear Tech. Corp. v. Impala Linear Corp.*, 379 F.3d 1311, 1320 (Fed. Cir. 2004). This Court has remarked that "[c]ourts have concluded in many instances that such terms such as 'processor,' 'circuit,' and 'logic' may connote sufficiently definite structure…" *Sonrai Memory Ltd. v. Oracle Corp.*, No. 1:22-CV-94-LY, 2022 WL 800730 at * 8 (W.D. Tex. Mar. 16, 2022).

For the '090, '196, and '628 Patents (all sharing the same specification), the specification goes beyond only citing a class of structures. Figure 26 shows the context in which the processor operates within the claimed electronic device and what other system elements it is connected to. *See*, *e.g.*, '090 Pat. Fig. 26. The processor is described as controlling the operation of memory and implementing one or more of the elements in the disclosed flowcharts. *See*, *e.g.*, *id.* at 41:20-31. For the '179 and '184 Patents (sharing the same specification), the disclosed structure is that of a DSP, which, as stated before, would be known to a PHOSITA as sufficient structure being a specific structure for audio processing. *See* Ex. 7, Begault Decl. ¶15; *see also*, *e.g.*, '179 Pat. at 5:19. The specification discloses using the DSP for its typical intended purpose—audio processing—not in special way as decried by Defendants. *See id.* at 5:19, 33-41 (using it for filter sound), 35:45 (as part of an audio processing circuit), 36:13-23 (as part of a sound card/chip performing normal functions like amplification and filtering). For the '737 Patent, the disclosed processor structure that involves the functions of processing sound with an HRTF and localizing sound is regularly exemplified with a DSP. '737 Pat. at 20:48, 29:2, 29:9, 39:22, 56:14, 58:47-49, 58:66-59:3, 59:4-38. For the '836 Patent, the disclosed processor structure that involves the functions of processing sound with an HRTF and localizing sound is regularly exemplified with a DSP. '836 Pat. at 4:27-31, 27:34-38, 27:43-44, 28:26-30, 35:35-48, 38:40-46, *passim*. For both the '737 and '836 Patents, the DSP, as stated before, would be known to a PHOSITA as sufficient structure being a specific structure for audio processing.

To the extent that reciting known sufficient structures is viewed as inadequate as Defendants argue, the patents do describe functions that would add definition to the structures needed to process the sound as claimed. Dkt. 83 at 29 ("For example, disclosing the use of head-related transfer functions does not describe *how* to process sound as claimed."). For example, the '090, '196, '628,

'737, '836, '179, and '184 Patents all use the word "convolve" to describe what the processors are to do with the sound in relation to HRTFs and HRIRs. '090 pat. 28:56-62; '196 pat. 28:56-62; '090 pat. 29:27-33, cls. 1, 6, 7; '737 pat. passim; '836 pat. passim; '179 pat. 37:58-38:11; '184 pat. 37:58-38:11. The act of convolution on a signal is a standard mathematical operation taught as a fundamental principle in bachelors-level engineering course for many disciplines associated with potential PHOSITAs such as electrical engineering. Ex. 7, Begault Decl. ¶16; *see also* Exs. 10-14, Various Syllabi from relevant coursework showing that convolution was regularly taught as a principle for signal processing, even in 2011 (last visited May 3, 2023). As such, the only algorithm required to perform the claimed processes of applying an HRTF is a known unambiguous mathematical operation which a PHOSITA can implement. Given that it is unnecessary to disclose structure well-known to PHOSITAs or to recite actual computer code, the use of the word "convolve" with a transfer function would more than adequately instruct a PHOSITA on ***how*** to process sound as claimed. Ex. 7, Begault Decl. ¶16; *and Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1339-40 (Fed. Cir. 2016) (stating that well-known elements need not be disclosed); *Typhoon Touch Techs., Inc. v. Dell, Inc.*, 659 F.3d 1376, 1386 (Fed. Cir. 2011) (stating that it is unnecessary to provide computer code). In no way have Defendants shown that a processor or DSP would not be understood by a PHOSITA as a definite structure for performing the convolution of auditory signals with HRTFs. Indeed, to follow the reasoning of Defendants' expert, the structure of the patents would not be sufficient and would not be an algorithm unless every single step necessary to implement the invention were present. *See* Ex. 3, McMullen Tr. at 54:10-63:08 (showing that Dr. McMullen did not read figures in light of the text), 94:19-96:13 (denying a flowchart as an algorithm), 96:19-102:22 (requiring excruciating detail be disclosed to PHOSITA), 134:12-142:15 (requiring excruciating detail be disclosed to PHOSITA), 172:2-180:22 (claiming that a PHOSITA

would need to every common mathematical step spelled out). This is the equivalent of forcing a patentee to describe how to make a screw or a nail when reciting a fastener between connected boards. The law has never been so demanding. In conclusion, Section 112(f) does not apply and Defendants have not rebutted the presumption against application.

2. Even if Section 112(f) Applies, the Patents Provide Ample Structure for Performing the Recited Functions and Are, Therefore, Definite.

Computer implemented claim limitations subject to Section 112(f) need to disclose more structure than a general-purpose computer or processor. *Williamson*, 792 F.3d at 1352; *Aristocrat*, 521 F.3d at 1333. To create sufficient structure, the specification needs to disclose an algorithm for performing the claimed function. *Williamson*, 792 F.3d at 1352. Under well-established precedent, an "algorithm" is nothing more than a "*step-by-step procedure* for solving a problem or accomplishing some end." *In re Freeman*, 573 F.2d 1237, 1245 (CCPA 1978) (emphasis added); *Typhoon Touch Techs., Inc. v. Dell, Inc.*, 659 F.3d 1376, 1384 (Fed. Cir. 2011) (quoting *In re Freeman*); *Intelligent Automation Design, LLC v. Zimmer Biomet CMF & Thoracic, LLC*, 799 F. App'x 847, 851-52 (Fed. Cir. 2020) (following *Typhoon*). Repeatedly, the Federal Circuit has declared that a patentee may express an algorithm "in *any understandable terms* including as a *mathematical formula*, in *prose*, or as a *flow chart*, or in *any other manner* that provides sufficient structure." *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1340 (Fed. Cir. 2008) (emphasis added); *Typhoon*, 659 F.3d at 1385; *Williamson*, 792 F.3d at 1352. Defendants' expert was unaware of this definition and the case law. Ex. 3, McMullen tr. at 172:2-174:17 (stating that she did not know the legal definition of an algorithm and claiming that a mathematical formula is not an algorithm).

Once it is determined that the specification discloses an algorithm, then the question becomes whether, in the eyes of a PHOSITA, the algorithm is sufficient to define the structure.

Noah Sys., Inc. v. Intuit Inc., 675 F.3d 1302, 1313: (Fed. Cir. 2012). The amount of detail required depends on the invention within the context of the field of the invention. *Typhoon*, 659 F.3d at 1385 (holding that a four-step algorithm was sufficient). It is unnecessary to disclose computer code and a mere "description of the function in words may 'disclose, at least to the satisfaction of one of ordinary skill in the art, enough of an algorithm to provide the necessary structure under §112, ¶6.'" *Id.* at 1386 (quoting *Finisar*, 523 F.3d at 1340). A PHOSITA has sufficient skill to recognize the functions / structures from the described functions in the "Processor Terms" chart from the Dkt. 83. Ex. 7, Begault Decl. ¶15. Structures well-known to PHOSITAs may be relied upon in the algorithm and need not be disclosed. *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1339-40 (Fed. Cir. 2016) (upholding the sufficiency of a four-step algorithm that did not disclose well-known structures).

The '090, '196, '628, '737, '836, '179, and '184 Patents disclose flowchart-styled algorithms in their figures to describe various processes for executing functions claimed in the patents. While these flow charts sometimes restate various claimed functions, they provide a high-level step-by-step process for executing the overall needed functions, which are sufficient for a PHOSITA to understand and even code the structure. However, any lack of detail or vagueness in the charts is addressed in the detailed description portion of the specification wherein specific operations and sometimes formulas are disclosed to add definition to the algorithms. Below is a chart that assembles disclosed algorithms from the patent specifications needed to execute the functions of each of the disputed terms.

CHART OF DISCLOSED ALGORITHMS		
Claim	**Defendants' Asserted Function**	**Algorithm to be Executed by a "Processor" as Disclosed in Patent**
'090 Pat., cl. 15	"adjust the binaural voice of the second person during the electronic phone call in order to position a sound	**Algorithm part 1 (localizing the sound)**: • Fig. 2 (placing the sound in the correct location and maintaining its relative position); • 5:45-8:64 (detailing each elements' steps in Fig. 2, including coordinate systems and description of

	localization point of the binaural voice to a location that is away from and proximate to the first person, wherein the sound localization point represents an origin of the binaural voice of the second person to the first person"	what auditory adjustment are necessary and the implementation of HRTFs to make them); • Fig. 3 (placing the sound in the correct location and maintaining it relative position using HRTFs); • 8:65-10:18 (describing the variables that need to be accounted for in each elements' steps in Fig. 3, including how to make auditory adjustments necessary to maintain sound location and the implementation of HRTFs to make them); • Fig. 9 (maintaining sound localization points in response to head movements); • 21:7-22:54 (describing process for each elements' steps in Fig. 9, the adjustment factors and processes for HRTFs); **Algorithm part 2 (adjusting the binaural voice)** • Fig. 7 (accounting for environmental conditions); • 16:4-20:22 (describing the variables that need to be accounted for in each elements' steps in Fig. 7, including how to make auditory adjustments necessary to reproduce sound location and quality and the mathematical formulas to make them for environmental factors); • Fig. 11 (selecting an appropriate HRTF); • 21:7-22:54 (describing process for each elements' steps in Fig. 11, including the selection processes for HRTFs); • Fig. 12 (measuring impulses to calculate the proper HRIR need to produce accurate sound to listener); • 24:59-27:2 (describing process for each elements' steps in Fig. 12, including the process of aggregating HRIR data to create/improve personal HRIR and HRTFs); • 35:49-56 (explaining what well-known auditory adjustments are required for spatial audio location like Interaural Time Differences (ITD) and Interaural Level Differences (ILD)). • 27:5-29:44 (detailing how to calculate ITDs and ILDs)
'196 Pat., cl. 15	"receive a command from the person to move the SLP of the voice of the computer program from the first location in empty space to a second location in empty space that is proximate to the	**Algorithm part 1 (moving the SLP)**: • 36:13-17 (explaining what conventional techniques are used for receiving a desired sound location point from a system user); **Algorithm part 2 (localizing the sound)**: • Fig. 2 (placing the sound in the correct location and maintaining its relative position);

	first location and away from and proximate to the person, move the SLP of the voice of the computer program in response to the command from the first location in empty space to the second location in empty space, and provide binaural sound to the person through the wearable electronic device during the voice exchange between the computer program and the person such that an origin of the voice of the computer program occurs at the SLP at the second location in empty space that is proximate to the first location and away from and proximate to the person"	• 5:44-8:64 (detailing each elements' steps in Fig. 2, including coordinate systems and description of what auditory adjustment are necessary and the implementation of HRTFs to make them); • Fig. 3 (placing the sound in the correct location and maintaining it relative position using HRTFs); • 8:65-10:18 (describing the variables that need to be accounted for in each elements' steps in Fig. 3, including how to make auditory adjustments necessary to maintain sound location and the implementation of HRTFs to make them); • Fig. 9 (maintaining sound localization points in response to head movements); • 21:7-22:54 (describing process for each elements' steps in Fig. 9, the adjustment factors and processes for HRTFs); **Algorithm part 3 (adjusting the binaural voice)** • Fig. 7 (accounting for environmental conditions); • 16:4-20:22 (describing the variables that need to be accounted for in each elements' steps in Fig. 7, including how to make auditory adjustments necessary to reproduce sound location and quality and the mathematical formulas to make them for environmental factors); • Fig. 11 (selecting an appropriate HRTF); • 21:7-22:54 (describing process for each elements' steps in Fig. 11, including the selection processes for HRTFs); • Fig. 12 (measuring impulses to calculate the proper HRIR need to produce accurate sound to listener); • 24:59-27:2 (describing process for each elements' steps in Fig. 12, including the process of aggregating HRIR data to create/improve personal HRIR and HRTFs); • 35:52-57 (explaining what well-known auditory adjustments are required for spatial audio location like Interaural Time Differences (ITD) and Interaural Level Differences (ILD)). • 27:3-29:44 (detailing how to calculate ITDs and ILDs)
'196 Pat., cl. 19	"change attenuation and reverberation of the binaural sound in order to add artificial audial cues of virtual objects near the person, wherein	**Algorithm part 1:** • Incorporation of all algorithmic steps from cl. 15 from which cl. 19 depends. **Algorithm part 2 (changing attenuation and reverberation to add artificial cues)**:

	the virtual objects do not actually exist near the person but are perceived to exist by the person from the artificial audial cues"	• 17:13-17:43 (explaining how to calculate reverberations, real or theoretical, including exemplary mathematical formula); • 19:20-20:33 (explaining how to attenuate sound based on environmental conditions, real or theoretical, including exemplary mathematical formulae);
'628 Pat., cls. 9, 12	"processing a voice of the calling party with head related transfer functions (HRTFs) so the voice of the calling party localizes to the called party as binaural sound at a sound localization point (SLP) that is one meter to two meters away from the called party"	**Algorithm part 1 (providing localized sound to listener):** • Fig. 1 (capturing, designating location, processing, and reproducing sound listener can localize). • 3:5-5:50 (describing the types and quality of sound inputs, what spatial considerations must be made for sound localization, and the use of HRTFs and other adjustments to simulate a sound localization point); • Fig. 4. (using a virtual microphone locations to better approximate the localization of sound • 10:29-11:18 (describing how to factor head orientation and speaker movement relative speaker location at virtual microphone point and to adjust sound to mimic the changes in speaker orientation and location to maintain consistent spatial location); • Fig. 9 (maintaining sound localization points in response to head movements); • 21:7-22:54 (describing process for each elements' steps in Fig. 9, the adjustment factors and processes for HRTFs); **Algorithm part 2 (processing with an HRTF)**: • Fig. 11 (selecting an appropriate HRTF); • 23:63-25:24 (describing process for each elements' steps in Fig. 11, including the selection processes for HRTFs); • Fig. 12 (measuring impulses to calculate the proper HRIR need to produce accurate sound to listener); • 25:25-27:38 (describing process for each elements' steps in Fig. 12, including the process of aggregating HRIR data to create/improve personal HRIR and HRTFs); • 36:36-42 (explaining what well-known auditory adjustments are required for spatial audio location like Interaural Time Differences (ITD) and Interaural Level Differences (ILD)).

		• 27:39-30:18 (detailing how to calculate ITDs and ILDs)
'628 Pat., cl. 16	"processing, during the telephone call, a voice of the calling party with head related transfer functions (HRTFs) so the voice of the calling party localizes to the called party as binaural sound at the image of the calling party that appears at least one meter away from the head of the called party … changing, during the telephone call and in response to the head movements of the called party, the HRTFs processing the voice of the calling party so the voice of the calling party continues to localize to the image of the calling party that appears at least one meter away from the head of the called party as the head of the called party moves and changes head orientations"	**Algorithm part 1 (providing localized sound to listener):** • Fig. 1 (capturing, designating location, processing, and reproducing sound listener can localize). • 3:5-5:50 (describing the types and quality of sound inputs, what spatial considerations must be made for sound localization, and the use of HRTFs and other adjustments to simulate a sound localization point); • Fig. 4. (using a virtual microphone locations to better approximate the localization of sound • 10:29-11:18 (describing how to factor head orientation and speaker movement relative speaker location at virtual microphone point and to adjust sound to mimic the changes in speaker orientation and location to maintain consistent spatial location); • Fig. 9 (maintaining sound localization points in response to head movements); • 21:7-22:54 (describing process for each elements' steps in Fig. 9, the adjustment factors and processes for HRTFs); **Algorithm part 2 (processing with an HRTF)**: • Fig. 11 (selecting an appropriate HRTF); • 23:63-25:24 (describing process for each elements' steps in Fig. 11, including the selection processes for HRTFs); • Fig. 12 (measuring impulses to calculate the proper HRIR need to produce accurate sound to listener); • 25:25-27:38 (describing process for each elements' steps in Fig. 12, including the process of aggregating HRIR data to create/improve personal HRIR and HRTFs); • 36:36-42 (explaining what well-known auditory adjustments are required for spatial audio location like Interaural Time Differences (ITD) and Interaural Level Differences (ILD)). • 27:39-30:18 (detailing how to calculate ITDs and ILDs)
'737 Pat., cls. 1, 14, 15, 16	"processing … sound with head-related transfer functions (HRTFs) to generate the binaural sound that	**Algorithm part 1 (localizing to a sound localization point in space):** • Fig. 1 (Process for designating zones for SLPs);

	externally localizes to the user at the location of the SLP in empty space in the zone above the physical floor" / "processes sound with head related transfer functions (HRTFs) so sound externally localizes as binaural sound to the user at the SLP in empty space inside the 3D zone defined by movement of the PED"	• 2:32-7:2 (describing the ways to divide a 3D space into zones and how to manage and use spatial data associated with sounds such as personalized HRFTs); • Fig. 2 (process for selecting SLPs and Providing sound back from those SLPs); • 7:3-10:51 (describing how stored or transmitted sound and accompanying sound date relates to producing the sound at a designated point in space, and stating that the sound must be convolved to reproduce it in the correct spatial location); • Fig. 6 (process for determining/designating SLPs and producing localized sound to the user); • 18:33-22:18 (describing the process of taking sound location data and meshing it with an HRTF convolution to reproduce sound via a DSP or similar at a designated SLP); **Algorithm part 2 (processing with an HRTF)**: • Fig. 10 (process for convolving sound with sound location information); • 34:46-42:44 (describing process for each elements' steps in Fig. 10, including the use of transmitted personal HRTFs, the use generic HRTFs, and stored ILDs and ITDs to process sound on a DSP/CPU/etc. wherein the output sound would be perceived from the correct SLP);
'836 Pat., cls. 8, 10	"process sound for the image to generate binaural sound that has a sound localization point (SLP) with a coordinate location that occurs at a far-field distance located behind the image and along a line-of-sight from the user to the image while the display displays the image to the user at the near-field distance"	**Algorithm (localizing to a sound localization point behind the display):** • Fig. 1 (Process for designating SLPs behind a display); • 5:58-8:39 (explaining the selection process for determining the desired SLP distance); • Fig. 9 (process for convolving sound with HRTF to emanate sound from the SLP); • 26:22-33:48 (Explains the formulas and convolution process for implementing HRTFs to produce spatial sound using a DSP);

'836 Pat., cls. 8, 10	"processes the sound for the image with far-field head-related transfer functions (HRTFs) while the electronic device is located at the nearfield distance from the head of the user"	**Algorithm (localizing to a sound localization point behind the device):** • Fig. 1 (Process for designating SLPs behind a display); • 5:58-8:39 (explaining the selection process for determining the desired SLP distance); • Fig. 9 (process for convolving sound with HRTF to emanate sound from the SLP); • 26:22-33:48 (Explains the formulas and convolution process for implementing HRTFs to produce spatial sound using a DSP);
'179 Pat., cl. 14; '184 pat., cl. 14 (Identical Specs.)	"processing … sound with the HRTFs to generate binaural sound that externally localizes to the user at the virtual image in the environment" / "processing … sound with the HRTFs to generate binaural sound that externally localizes in empty space from the virtual image in the environment"	**Algorithm part 1 (Associating sound with image in virtual environment):** • Fig. 11 (process for keeping an SLP associated with an image); • 21:14-22:50 (describing the processes of adjusting/updating HRFTs to ensure that an SLP matches the computer's know visual location of an image); **Algorithm part 2 (processing with an HRTF)**: • 5:42-5:61 (Explaining the use of HRTFs, ITD, and ILDs to create perceived SLPs); • Fig. 18 (showing that a sound localization system/sound hardware would be an element to execute auditory processing) • 37:58-38:11 (describing the common rendering processes necessary to localize sound such as interpolation, convolution, filtering, etc.).

These flow charts, when read in light the patent specifications, provide clear descriptions of the functions and even provide necessary mathematical formulas and other structure to form the needed algorithms.

IV. CONCLUSION

For the foregoing reasons, 8kHz respectfully request that the Court reject Defendants' proposed claim constructions and adopt its proposed claim constructions or find that the terms ordinary and customary meanings, as discussed herein, apply.

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Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on May 3, 2023 the foregoing was filed electronically in compliance with the local rules and served via the Court's electronic filing system on all counsel who have consented to electronic service.

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