

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.,
Petitioner,

v.

EIGHT KHZ, LLC,
Patent Owner.

Case IPR2023-01023
Patent 10,798,509

PATENT OWNER'S PRELIMINARY RESPONSE
35 U.S.C. §313, and 37 C.F.R. §42.107(a)

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EXHIBIT LIST

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2005	U.S. District Court Order in <i>Eight kHz, LLC v. Meta Platforms, Inc.</i> , No. 6:22-cv-00575-ADA-DTG (W.D. Tex. Sep. 11, 2023), Resetting Markman Hearing Via Zoom
2006	Memorandum from Katherine K. Vidal on Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (June 21, 2022)
2007	Lex Machina, Patent Cases (All Judges) Time to Trial, U.S. District Court for the Western District of Texas, September 9, 2023
2008	Lex Machina, Patent Cases (Judge Alan D. Albright) Time to Trial, U.S. District Court for the Western District of Texas, September 9, 2023
2009	U.S. District Court Minute Entry in <i>Eight kHz, LLC v. Meta Platforms, Inc.</i> , No. 6:22-cv-00575-ADA-DTG (W.D. Tex. Oct. 3, 2023), Denying Motion to Transfer Venue

Patent Owner Eight KHZ, LLC (“8KHZ”) submits this Preliminary Response (“POPR”) to the Petition for *inter partes* review (“IPR”) of claims 1-14 and 17-20 of U.S. Patent No. 10,798,509 (“’509 Patent”; Ex. 1001). Paper 2 (“Petition”; “Pet.”).

I. INTRODUCTION

A. The ’509 Patent

The ’509 Patent is titled “Wearable Electronic Device Displays a 3D Zone From Where Binaural Sound Emanates,” and was issued by the United States Patent and Trademark Office on October 6, 2020. Ex. 1001.

1. **The ’509 Patent discloses and claims a novel and nonobvious improvement to methods of zonal definition and interaction in an extended reality application.**

The ’509 Patent is directed to defining a zone that contains sound localization points (SLPs). Figures 9A to 10D depict a person with a portable electronic device (PED) in hand or attached to a pole generating SLPs at different locations in a zone surrounding the user. The user then can select or highlight an SLP for sound localization from a source the user designates. *See* ’509 Patent, 28:19-29; Fig. 13. “Thereafter, sounds will localize to this selected SLP, such as sounds heard through a wearable electronic device.” *Id.*

The ‘509 Patent also discloses determining when the user or the handheld controller is leaving the zone using an integrated tracking system in the HMD, and displaying a virtual image of the zone in response to determining the user or handheld controller is leaving the zone. *See, e.g.*, ‘509 Patent, 19:64-20:28; claims 9 and 17.

2. The challenged claims

Claims 1, 9, and 17 are the independent challenged claims.

II. ASSERTED GROUNDS OF UNPATENTABILITY

Petitioner asserts two grounds of unpatentability. Grounds 1 and 2 challenge the patentability of claims 1-14 and 17-20. Ground 1 asserts that claims 1-14 and 17-20 are unpatentable under 35 U.S.C. §103 over Pedrotti (“Pedrotti”; Ex. 1005) in view of Jang (“Jang”; Ex. 1006), and further in view of Begault (“Begault”; Ex. 1007). Pet. 4. Ground 2 asserts that claims 1-14 and 17-20 are unpatentable under 35 U.S.C. §103 over McCulloch (“McCulloch”; Ex. 1008), in view of Pedrotti, and further in view of Flaks (“Flaks”; Ex. 1009). Pet. 46.

A. Person of Ordinary Skill in the Art

For purposes of the POPR, 8KHZ applies Petitioner’s characterization of a person of ordinary skill in the art (“POSITA”).

B. Petitioner’s Proposed Claim Construction Should be Rejected

The claim terms should be given their “ordinary and customary meaning” as understood by a POSITA in view of the patent claims, specification and prosecution history. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-14 (Fed. Cir. 2005) (en banc); and 37 C.F.R. § 42.100(b). There is a “heavy presumption” that the ‘509 Patent’s disputed claim terms “are to be given their ordinary and customary meaning.” See *Aylus Networks, Inc. v. Apple Inc.*, 856 F.3d 1353, 1358 (Fed. Cir. 2017) (citation omitted). The ordinary meaning may be readily apparent to a POSITA, and claim construction can involve merely accepting the meaning of commonly understood words. *Phillips*, 415 F.3d at 1314.

The Petitioner’s “any reasonable construction, including their plain meaning” harkens back to the broadest reasonable interpretation standard used by the Board before November 13, 2018 and conflicts with the expressed directive that the Board use the same claim construction standard as in a civil action. 37 C.F.R. § 42.100(b). Thus, Petitioner’s assertion that the claims should be construed to include “any reasonable construction” should be rejected. Pet. 5. Here, no express constructions of the claims are necessary. To the extent that any term needs construction, the plain and ordinary mean of the term should be adopted.

III. PETITIONER HAS FAILED TO ESTABLISH A REASONABLE LIKELIHOOD THAT ANY CLAIM IS UNPATENTABLE

A. Institution Standards

The Petition must demonstrate a reasonable likelihood that at least one of the Challenged Claims is unpatentable for the Board to institute review. 35 U.S.C. §314(a); 37 C.F.R. §42.108(c). The Board “will not take on the role of advocate for a party, trying to make out a case the party has not adequately stated.” Standing Order ¶121.5.2 (B.P.A.I. Mar. 8, 2011). Rather, it is Petitioner’s duty to provide sufficient grounds for the institution of a review “focus[ing] on concise, well organized, easy-to-follow arguments supported by readily identifiable evidence of record.” *Cisco Sys., Inc. v. C-Cation Tech, LLC*, IPR2014-00454, Paper No. 12 at 11 (PTAB Aug. 29, 2014).

Petitioner asserts two obviousness grounds of unpatentability. Pet. 2. The ultimate determination of obviousness under 35 U.S.C. §103 is a question of law based on underlying factual findings. *In re Baxter Int’l, Inc.*, 678 F.3d 1357, 1362 (Fed. Cir. 2012) (*citing Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966)). “To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements. The petitioner must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380-81 (Fed. Cir. 2016). The specific reasoning must include some rationale underpinning to combine the prior art elements as claimed to support the conclusion of obviousness. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). It is Petitioner’s burden to demonstrate a

motivation to combine, and a reasonable expectation of success. *See In re Magnum Oil Tools*, 829 F.3d at 1381. Mere conclusory statements are insufficient. *Id.* at 1380.

For the purpose of this POPR, the Board need only consider the validity of independent claims 1, 9, and 17 of Grounds 1 and 2. As shown below, the Petition fails to establish a reasonable likelihood that Petitioner will prevail on either ground for any independent claim. A trial therefore should not be instituted.

B. Ground 1 Should Not Be Instituted Because No Combination of Prior Art Teaches Fully-Integrated Tracking by a Wearable Electronic Device.

Petitioner asserts claims 1-14 and 17-20 are obvious over the combination of Pedrotti, in view of Jang, and further in view of Begault, and argues that a POSITA would have been motivated to combine the systems described in Pedrotti with the sound processing techniques described by Jang and Begault. Pet. 9-11.

As shown in more detail below, the system claimed in the '509 Patent is meaningfully different from what is disclosed in Pedrotti, which requires a stationary base station to track the position of the user within the “safe area,” in contrast to the integrated tracking system in the HMD in the claimed invention. Further, Petitioner has failed to establish that a POSITA would have been motivated to combine Pedrotti with Jang at the time of filing as Jang does not address a virtual reality user physically moving in a physical space but instead is directed to sound processing when a character moves within a virtual world to minimize lag.

Even assuming the hypothetical combination of Pedrotti and Jang were appropriate, whatever motivation a POSITA would have to combine Pedrotti with Jang and/or Begault would not yield the same system or methods claimed in the '509 Patent, as explained below. The Petition thus fails to establish a reasonable likelihood that these asserted references would have rendered the challenged claims obvious and thus should be denied.

1. Overview of Pedrotti

Pedrotti is directed to a system that allows a virtual reality user to define a “safe area” clear of physical obstacles using a stationary base station as a reference point. When the user approaches a boundary of the “safe area” while wearing a head mounted display (HMD), the Pedrotti system displays a visual boundary in virtual space to the user via the HMD. Pedrotti, Abstract. In this way, Pedrotti helps users wearing an HMD avoid collisions with physical objects in the real world, recognizing that users cannot see the real world while wearing the HMD and experiencing the virtual world. *Id.* 2:4-6 (“[W]hen using a HMD the user is unable to see those nearby [physical] objects while in the virtual world, and may thus not be aware of impending collisions.”); *Id.* 4:46-48 (“HMD 106 covers the user’s eyes and presents the user with a representation of a virtual world, while preventing the user from seeing the real, or physical, world.”). Pedrotti discloses that when the user comes within a predetermined distance of a boundary of the “safe area,” the

HMD displays a visual warning, such as a grid or virtual fence, to alert the user it is about to move out of the “safe area.” *Id.* 4:32-44; *see also* 2:21-26, 32-43, 50-59, 3:1-13.

To establish the “safe area” and the position of the HMD within the “safe area,” Pedrotti discloses using trackers, which can be attached to or incorporated in the HMD and/or on a controller held by the user. The trackers are used to determine the position and orientation of the HMD and/or the handheld controller relative to a stationary base station, “by, for example, sensing an electromagnetic field generated from a local base station, video game console or other apparatus (not shown).” *Id.*, 4:49-54. *See also id.*, 5:29-34 (“[In addition to tracker 108 in HMD 106, handheld controller 110 may also have a tracker, from which a processor can derive the position and orientation of handheld controller 110 relative to the base station, by any of the tracking techniques described above.”).

To determine the position of the HMD within the safe area, Pedrotti discloses that in some embodiments “the base station or console may contain the processor as well as the other components needed to determine the position and orientation of the trackers in the HMD and controllers. For example, the base station may contain the electromagnetic field source for electromagnetic trackers, a camera for optical

detection of certain type of trackers, or other elements needed to determine the position and orientation of other types of trackers.” *Id.*, 5:59-63.¹

Using the relative distance and position of the HMD and/or controller(s) to the base station, the processor determines if the user is approaching a boundary of the safe area. When the user is within a preselected distance of the boundary, the system causes visual changes in the display. *Id.*, 12:31-50. For example, the processor may generate a warning by adding an element to the virtual world that can be seen by the user, such as a grid of lines or a “virtual fence.” *Id.* Pedrotti provides that the virtual fence “need not cover the entire display of the HMD” and instead discloses that “it will generally be sufficient for the processor to generate instructions to have the HMD display show the virtual fence 1114 in an area around the point in the virtual world at which the user’s head or hand has approached the boundary of the selected area.” *Id.*, 13:12-20. Pedrotti discloses that a limited display of the virtual fence, rather than displaying the entire virtual fence, may be used to minimize rendering cost. *Id.* (“To minimize rendering cost, the fence may be rendered as a projected texture on small pieces of 3D geometry that cover only the areas where the fence is to be visible.”).

¹ The term “base station” in Pedrotti is used synonymously with a video game console or other apparatus. Pedrotti, 4:53-54, 5:55-63.

Pedrotti teaches that the safe area can be defined in several ways. For example, “a person, such as the user ... may input information into the processor indicating that there is a circular area in front of the base station and having a measured diameter that is clear of objects,” as shown in Figure 12. *Id.* 14:7-12. In addition, the safe area may be defined by activating a tracker in either the HMD or the handheld controller at a position in front of the base station. The processor in the base station can then determine how far away the tracker is from the base station and then determine a circular area having a radius of that distance. *Id.* 14:15-24.

Pedrotti also discloses defining an irregularly-shaped safe area by “having the user walk around a perimeter chosen by the user with one of the trackers to define the outer boundary of a selected area, for example, one in which there are no obstacles.” The processor in the base station “determines the position of the tracker at a number of sampling points as the user moves around the chosen perimeter, and from those points determines the boundary.” *Id.* 14:56-65.

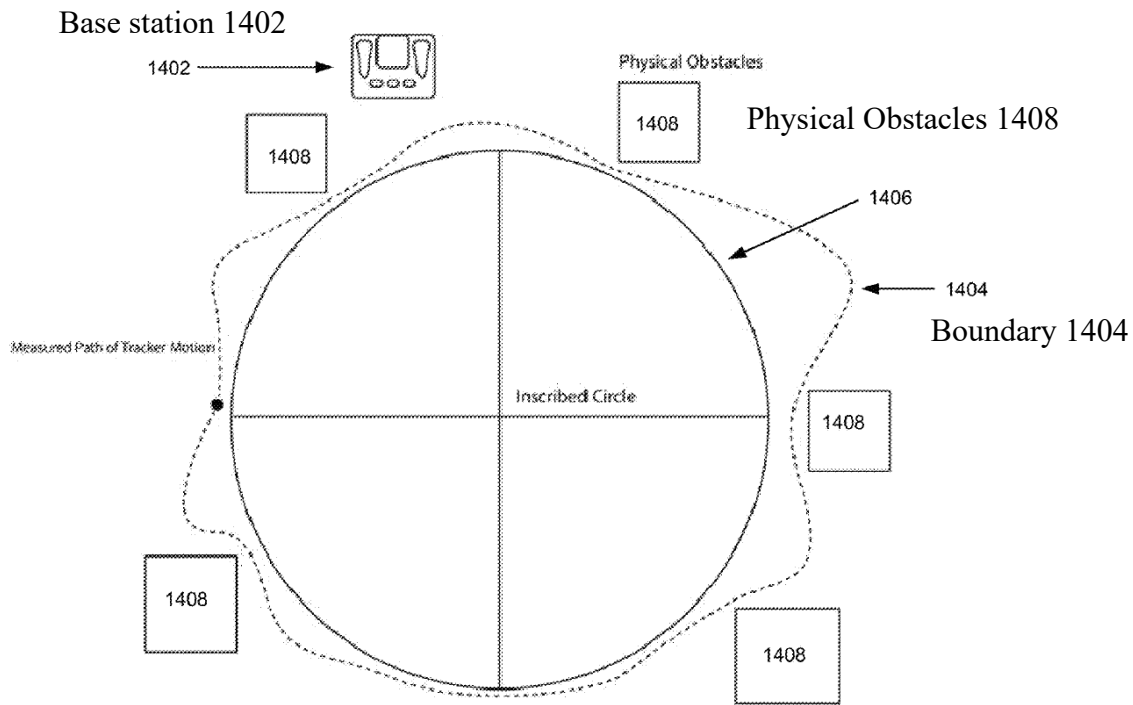


Figure 14

Pedrotti, Fig. 14 (annotations added).

2. Overview of Jang

Jang is directed to sound processing in virtual environments and in particular discloses “sound areas” within a virtual environment that are categorized as “a focus area” and “a non-focus area” to conserve processing power and minimize lag. Jang describes a problem where, when a character or avatar in virtual reality “shifts between virtual spaces” or moves within the virtual environment, sound lags behind this virtual movement and causes a time delay that “may degrade the sense of reality in the sound.” Jang, 2:1-9. To minimize the delay and provide an improved sense of realism, Jang designates the visual field as focus areas and non-focus areas and

prioritizes processing of sound in the focus areas over sound in the non-focus areas. *Id.* 2:15-20; 2:36-41; 3:27-30. The difference in processing sounds may cause the audio elements of the non-focus area, for example, to be “muffled or quieter than audio elements of a focus area.” *Id.* 6:52-55.

The movement in Jang is not a user moving in a physical space, like Pedrotti, but instead is an avatar moving in virtual space, such as moving from a virtual basketball court to a virtual conference room. *Id.* 6:35-38; 10:32-36; *see also* 11:28-41 (“it is possible to minimize the time delay occurring during the sound processing at the time of virtual space shift in a virtual reality system.”). Jang discloses that this movement of the character in the virtual space can occur when the user provides an input through a key input unit, such as a keyboard. *Id.* at 9:11-14. Thus, the user in Jang is stationary in the physical space, but the user’s avatar is moving in the virtual space.

3. Overview of Begault

Begault teaches a graphical user interface (GUI) that displays distinct images or icons that show where sound will localize to the user. As shown in Fig. 5.12 and accompanying discussion, when the user selects a location for one of these images, location configuration parameters for a sound source are changed, such that, as sound inputs become active (e.g., are received by the system), sound emanates from the specified location. Begault, 172-173.

4. The hypothetical combination does not render obvious any claim of the ‘509 Patent

Petitioner has failed to show a reasonable likelihood of success that Pedrotti, Jang, and Begault, alone or in hypothetical combination, teach or render obvious each and every limitation of the challenged claims in the ‘509 Patent. That is, the combination of Pedrotti, Jang, and Begault fails to teach (1) playing binaural sound emanating from a sound localization point in response to the sound localization point being pointed at by a handheld controller, as provided in independent claim 1 and (2) determining user location with respect to a zone in a physical space using a wearable electronic device (WED) worn on a head of the user, as provided in independent claims 1, 9 and 17.

a. The cited art does not disclose determining, with a wearable electronic device worn on a head of the user, when the user is located inside the zone

Petitioner’s argument that Pedrotti discloses an HMD (WED) and a handheld controller (HPED) wherein the WED, when worn on the head, determines when the user is located inside the zone by tracking the handheld controller – as required in claims 1, 9, and 17 – is based on a mischaracterization of Pedrotti and thus fails. Pet. 18-19, 24-26, 37, 39 (limitations 1[b], 9[b], 17[b,e]).

The basis for Petitioner’s argument that Pedrotti discloses an HMD that independently tracks a handheld controller is Pedrotti’s disclosure that *a processor* is used to determine location based on tracking data and a statement that the HMD

may contain one of several processors. *Compare* Pet. 10-13; *and* Welch ¶¶ 229-232 *with* Pedrotti, 16:22-24. When viewed in context, however, Pedrotti itself shows that this basis fails for a number of reasons. Pedrotti teaches tracking HMDs and handheld controllers *only* in relation to a base station or other stationary tracker, as shown below. Pedrotti never addresses how such tracking could be performed absent the use of a base station or other stationary tracker. Pedrotti thus does not disclose the integrated tracking system in the HMD, as in the claimed invention. In addition, tracking the handheld controller with Pedrotti's HMD, when worn on the head, to define a safe area is directly contrary to Pedrotti's teachings emphasizing the safety of the user by avoiding collisions with physical obstacles in the safe area. Declaration of John C. Hart, Ex. 2001 ("Hart"), ¶37. When the user is wearing Pedrotti's HMD, the user cannot see the physical world and thus cannot safely define the safe area.

As shown in more detail below, the cited references do not teach or suggest "determining, *with a wearable electronic device (WED) worn on the head of the user*, when the user is located inside the zone," as recited by independent claims 1 and 9; "determining, *with the WED* worn on the head of the user, when the user is leaving the zone," as recited by independent claim 9; or "*a wearable electronic device (WED) that is worn on a head of the user...* [that] includes one or more

sensors that sense when the PED leaves the zone,” as recited by independent claim 17.

b. None of the Cited Art Discloses Highlighting One of the Multiple SLPs

In addition, Petitioner has a failure of proof on other limitations in the independent claims of the ‘509 Patent based on the cited art. None of the cited art discloses highlighting, while the user is located in the zone, one of the multiple SLPs in the zone when the handheld controller is pointed at the one of the multiple SLPs in the zone, as required by claim 1. Pedrotti is completely silent on highlighting virtual items within the zone and Jang is likewise silent on using a handheld controller to select or emphasize images associated with the sounds from the focus area or the non-focus area.

c. Petitioner Erroneously Relies on Prior Art Outside Cited Combination

Furthermore, regarding playing with the WED worn on the head of the user the binaural sound in response to the one of the multiple SLPs being pointed at by the PED held in the hand of the user, Petitioner relies upon VR Book, 281 (Ex. 1063), *which is not part of the cited combination* allegedly rendering claim 1 obvious and thus is improper. *See, e.g.*, 37 C.F.R. § 42.104(b)(4).

In view of these deficiencies among others provided in the detailed claim discussions provided below, Patentee submits that Pedrotti, Jang, and Begault, alone

or in hypothetical combination, do not teach or render obvious each and every limitation of the challenged claims in the ‘509 Patent. As such, the Board should therefore deny institution.

5. Independent Claim 1

a. Limitation 1[b]: Determining When In the Zone with WED Worn on Head

Limitation 1[b] recites determining when the user is located inside the zone with a WED worn on the head of the user. Petitioner erroneously asserts that Pedrotti teaches that the tracking processor “may be ‘in the HMD’.” Pet. 18. Pedrotti, however, does not disclose determining, *with a wearable electronic device (WED) worn on the head of the user*, when the user is located inside the zone – that is, an integrated tracking system in the HMD – but instead relies on a stationary base station that is external to the HMD.

First, Pedrotti consistently refers to the “processor” used for tracking purposes as something outside of the HMD – the processor in the stationary base station, not a processor in the HMD. All of Pedrotti’s teachings on tracking involve the stationary base station. Pedrotti teaches that whether by electromagnetic fields, light emitting trackers, or other forms, the HMD and handheld controller is tracked in relation to their distance from a base station. *Id.*, 4:49-58, 5:7-24; Hart ¶36.

Specifically, Pedrotti repeatedly teaches that all tracking of both the HMD and the handheld controller is performed in relation to a “base station,” game console, or

other device, which is outside the HMD. *See, e.g.,* Figure 14, reproduced above, showing base station 1402. Hart ¶36.

Pedrotti teaches tracking HMDs and handheld controllers *only* in relation to a base station or other stationary tracker (all emphases added):

- “In addition to tracker 108 in HMD 106, handheld controller 110 may also have a tracker, *from which a processor can derive the position and orientation of handheld controller 110 relative to the base station*, by any of the tracking techniques described above” *Id.*, 5:29-34.
- “it will be desirable for the base station to also contain a tracker similar to those used in the HMD and controllers, so that the position of the base station is known and thus *the positions of the HMD and controllers relative to the base station can be determined*” *Id.*, 6:3-10.
- “by using information from the tracker in the right physical controller to determine the position of the right physical controller *relative to the physical base station...*” *Id.*, 7:66-8:2.
- “... processor is able to determine the position and orientation of the base station, and thus *track the position and orientation of the HMD and controller(s) relative to the base station.*” *Id.*, 10:20-27.
- “... the processor can determine *how far away the tracker is from the base station...*” *Id.*, 14:20-23.

See also Hart, ¶36. Pedrotti never addresses how such tracking could be performed absent the use of a base station or other stationary tracker.

Second, tracking the handheld controller with the HMD while worn on the head to define a safe area with the system disclosed by Pedrotti is directly contrary to Pedrotti's teachings emphasizing the safety of the user by avoiding collisions with physical obstacles in the safe area. Hart, ¶37. Petitioner argues that Pedrotti discloses "the processor" tracking the handheld controllers "determines the position of the tracker [in the handheld controller] at a number of sampling points as the user moves around the chosen perimeter, and from those points determines the boundary." Pedrotti, 14:57-65. Such tracking to generate a safety boundary cannot be provided via a processor within Pedrotti's HMD because once the user is wearing the HMD, the user cannot see the physical world to navigate the chosen perimeter and avoid physical obstacles. Hart, ¶37. Indeed, Pedrotti states, once the user "has donned the HMD, [the] user can no longer see the surrounding physical world" and cannot see the location of any physical obstacles. *Id.* 1:30-33, 6:23-25 (quoted), 11:52-55, 12:28-30. Petitioner's position, which would have a user walking in the physical world but unable to see any physical obstacles *is contrary to the explicit teachings* in Pedrotti of methods to *avoid collisions with physical obstacles*. Hart, ¶37. Therefore, it is clear that the Pedrotti system does not envision and, indeed, cannot provide controller tracking via a processor of the HMD and thus, does not

teach or suggest handheld controller tracking by an HMD (WED) worn on the head of the user. *Id.*

Third, Petitioner's assertion that Pedrotti's light-emitting trackers in the controller are used by a camera mounted on the HMD to track the position of the controller, even if true, would not track the position of the controller in relation to the "safe area," but instead would merely track the position of the controller relative to the HMD. Hart, ¶37. That is, if the HMD and the controller of Pedrotti both move together as asserted by Petitioner, the tracked boundary could only be defined as a relative distance between the HMD and the controller. Because Pedrotti only describes tracking systems that receive input (e.g., light, magnetic fields) from trackers to determine positions, as opposed to a GPS or other system as described in the '509 Patent, the HMD could only determine a boundary that defined a maximum relative distance between the HMD and the controller. Pedrotti, 4:49-5:24; Hart, ¶40. This would frustrate the purpose of Pedrotti of keeping a user in a safe area. Hart, ¶37. *Plas-Pak Indus., Inc. v. Sulzer Mixpac AG*, 600 F. App'x 755, 758 (Fed. Cir. 2015) ("[B]asic principles under which the [prior art] was designed to operate, or that render the prior art 'inoperable for its intended purpose,' may fail to support a conclusion of obviousness." (internal quotations omitted)). Indeed, the only component that could be practically employed to track a boundary using relative position data would be a stationary device, such as the base station as described

throughout Pedrotti. Pedrotti, 4:49-57, 5:7-11, 6:3-10, 7:66-8:2, 10:20-27, 14:7-10, 14:13-23.

Petitioner argues that an ambiguous statement that a processor “may be located . . . in the HMD” supports that the HMD tracks the handheld controller. Pet. 6; Pedrotti, 16:23-24. Petitioner takes this statement not only out of the context provided regarding the Pedrotti system, as shown above, but also out of the context provided in the paragraph. The complete statement is

There may be a single processor, or multiple processors *performing different functions* of the functions described herein. As above, a processor may be located in the base station, or in a separate location, *or even in the HMD* or one of the controllers if desired. *One of skill in the art* will appreciate how to determine which and how many processors will be appropriate for a specific intended application.

Id. 16:20-26 (emphasis added).

As shown above, in context, Pedrotti’s statement that a processor may be located “even in the HMD,” merely remarks that processors may be located in virtually any devices associated with the system to perform any number of “different functions of the functions described herein.” Pedrotti, 16:20-22; Hart, ¶38. For

example, the processor in the HMD may perform a function such as 3D scene rendering. *See, e.g., id.* 2:36-38 (“generating and outputting, by the processor, instructions to the HMD to display on the HMD a virtual world”); Hart, ¶38. Furthermore, Pedrotti routinely describes the processor responsible for tracking the handheld controller and/or HMD as *separate* from the HMD. *Compare Id.* 2:34-37 (“determining, by the processor, the position of the handheld controller in the physical world using information from the controller tracker”) *with* 2:40-41 (“generating and outputting, by the processor, instructions to the HMD”); 5:56-59 (“In some embodiments, the base station or console may contain the processor as well as the other components needed to determine the position and orientation of the trackers in the HMD and controllers.”); 8:51 (“The instructions from the processor to the HMD...”).

Petitioner’s argument is further undermined because Pedrotti teaches away from using an integrated tracking system within the HMD, stating,

If components such as the electromagnetic field source or camera used to determine the position of the HMD and controller trackers relative to the base station are not located in the base station, it will be desirable for the base station to also contain a tracker similar to those used in the HMD and controllers, *so that the position of the base*

station is known and thus the positions of the HMD and controllers relative the base station can be determined.

6:3-10 (emphasis added); *see also* 10:42-44 (“the processor determines based upon the position and orientation of the tracker in the HMD (and the tracker in the base station if appropriate) that the user has moved toward the physical base station.”); Hart, ¶39. Thus, Pedrotti’s tracking system depends on the presence of the stationary base station, which determines the positions of the HMD and the handheld controllers relative to the base station. Hart, ¶40.

In contrast to Petitioner’s assertion, as explained above, Pedrotti does not teach that the tracking processor may be in the HMD and, indeed, such possibility is incompatible with the boundary determination and HMD techniques disclosed by Pedrotti. Instead, Pedrotti discloses a processor in a stationary base station, external to the HMD, that tracks trackers with respect to the base station. Pedrotti, 5:30-33.

Thus, Pedrotti makes it clear that ***a stationary tracking device, external to the HMD, is required*** for tracking the HMD (e.g., the alleged WED) and handheld controllers (e.g., the alleged HPED). This is in contrast to the claimed invention, which uses an integrated tracking system in the HMD (WED). Hart, ¶¶39-41. Thus, Pedrotti does not teach or suggest zonal tracking of a user with a WED worn on the head of a user, let alone specifically tracking when the user is located inside the zone

with the WED. Further, Jang and Begault, alone or in hypothetical combination with Pedrotti do not obviate this deficiency of Pedrotti.

For at least these reasons, among others, Pedrotti fails to teach or suggest limitation 1[b].

b. Limitation 1[c]: Highlighting One of the SLPs when Pointed to by the Hand-Held PED

Limitation 1[c] recites, “highlighting, *while the user is located in the zone* and with a display of the WED, *one of the multiple SLPs in the zone when the PED held in the hand of the user is pointed at the one of the multiple SLPs in the zone*” (emphasis added). The highlighting occurs for a specific one of the multiple SLPs in the zone when 1) “the user is located in the zone” and 2) “the PED held in the hand of the user is pointed at the” SLP. Petitioner fails to meet its burden to show the cited references disclose even highlighting a SLP much less highlighting a SLP in response to the user pointing at the SLP.

i Highlighting a SLP

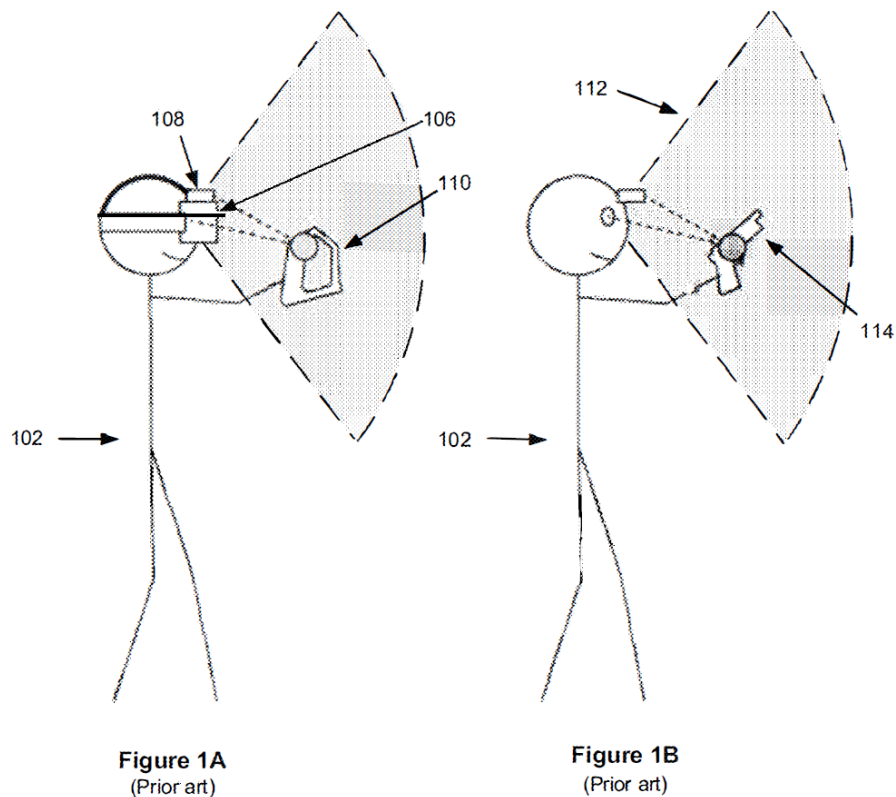
Petitioner relies upon Pedrotti’s disclosure that its virtual fence “can be glowing or colored if desired to be more visible,” to teach the concept of highlighting. However, Pedrotti’s virtual fence is not a sound localization point and thus does not teach or suggest “highlighting... one of the multiple SLPs.” Hart, ¶46.

Further, even if combining Pedrotti with Jang were a proper combination, which 8KHZ disputes, such combination does not disclose this limitation. Hart,

¶¶31-33. As discussed in more detail below, Jang uses a pre-defined scheme to adjust sound processing for different sounds in different areas. Jang, 9:49-50. Jang does not disclose anything regarding the selection or emphasis of images associated with the sounds from the focus area or the non-focus area. Accordingly, this combination does not teach or suggest highlighting of an SLP, let alone one of multiple SLPs in a zone while the user is in the zone.

ii **Highlighting the SLP When Pointed To While
User is in a Corresponding Zone**

Petitioner asserts that Pedrotti renders this claim limitation obvious, specifically citing disclosure that Pedrotti's controllers (PEDs) manipulate and control virtual objects in VR and suggesting that the pointing pattern is often used for selection. Pedrotti, however, is silent regarding "selection" of SLPs, as described above. Hart, ¶47. Further, as illustrated in FIGS. 1A and 1B of Pedrotti, Pedrotti's "virtual object" is a virtual representation *of the controller*, not an SLP that the controller can point to. *Id.* Indeed, as a virtual representation of the controller, it is impossible to point the controller to the virtual object, which is itself. *Id.*



Pedrotti, Figures 1A and 1B.

Thus, Petitioner has mischaracterized the manipulation and control of the “virtual objects” described in Pedrotti, construing these objects as items that can be “selected” and then bridging the selection to a statement not found in the references that the pointing pattern is often-used for selection. Hart, ¶48. Indeed, none of the references teach or suggest pointing to virtual objects with a PED, let alone pointing to one SLP of multiple SLPs in the zone to highlight the particular SLP.

Petitioner alleges that the hypothetical combination of Pedrotti with Jang would have signaled to a POSITA to point Pedrotti’s controller to select a sound source in Jang. However, Pedrotti does not disclose pointing to its virtual objects,

let alone for selection, and Jang does not disclose selection of one of its sound sources. Thus, even if Pedrotti and Jang were a proper combination, which 8KHZ disputes, this hypothetical combination does not support Petitioner's position. Hart, ¶¶31-33. Instead, as shown above, in contrast to pointing to virtual objects with a controller (PED), Pedrotti provides that virtual objects may represent the controller (PED). *See* Figures 1A and 1B, above.

Jang discloses processing sound in a focus area differently from sound in a non-focus area. Jang, Abstract. Specifically, the focus area is defined based upon the visual perspective of a virtual character, where immediate foreground sound ("focus area") is prioritized over sound outside of the immediate foreground ("non-focus area"). Jang, 4:20-24; Hart, ¶30. Jang teaches that a control unit 114 determines the priority of the sound sources within the focus area based upon a "predetermined scheme." *Id.*, 9:45-60. Thus, Jang does not suggest dynamic selection of audio sources for prioritized processing, but instead, at best moves a character's perspective to change a focus area. *Id.*, 10:33-36; Hart, ¶¶29-30. Thus, Petitioner's hypothetical of dynamically suggesting a pep band sound, or a conference attendee is a conclusory leap that is not taught or even suggested by the cited combination.

Additionally, none of the cited references suggest highlighting the SLP "while the user is located in the zone" let alone the combination of being located in the zone

and pointing to the SLP with the PED held in the user's hand. With respect to the zonal criteria for highlighting, Petitioner has not provided a rationale as to how the cited references alone or in combination teach or suggest this limitation other than saying "Pedrotti's system is used by a user in a zone." Pet. 19. However, there is no disclosure in Pedrotti of highlighting only while the user is in the zone, let alone while the user is in the zone and the hand-held PED is pointing to the SLP.

c. Limitation 1[d]: Playing the Binaural Sound from the Pointed to SLP

Limitation 1[d] recites, "playing, with the WED worn on the head of the user, the binaural sound that emanates from the one of the multiple SLPs in response to the one of the multiple SLPs being pointed at by the PED held in the hand of the user." As shown above, the cited references do not disclose pointing to an SLP with a PED held in the hand of the user. Accordingly, the references clearly do not disclose playing the binaural sound that emanates from the pointed to SLP, in response to such pointing.

In suggesting this limitation to be obvious, Petitioner relies upon VR Book, 281 (Ex. 1063), *which is not part of the cited combination* allegedly rendering claim 1 obvious. Specifically, Petitioner alleges that "it was well known ... that playing a sound (e.g., Jang's binaural sound)... could, like highlighting, facilitate user selection," quoting the VR Book as "explaining that 'objects can make a sound' "

when... *they have been selected*'"). Pet. 23 (emphasis added.) First, as mentioned above with respect to limitation 1[c], Pedrotti and Jang do not teach or suggest user selection of virtual objects let alone via pointing from a hand-held PED. Second, even if playing a sound was well known for facilitating user selection, the current claim limitation triggers playback of sound in response to pointing – not selection – of the SLP. Thus, even if “objects can make a sound” “when... they have been selected,” as posited by Petitioner, this is not analogous to playing the binaural sound emanating from the SLP in response to “being *pointed at* by the PED,” as recited by limitation 1[d].

Further, even assuming *arguendo* that sound playback based up on selection of an object was known, the current claims provide playback of binaural sound that emanates from the one of the multiple SLPs in response to being pointed at. None of the cited references disclose such functionality with respect to SLPs. Indeed, Pedrotti is silent regarding SLPs. Further, Jang, at best, teaches changing prioritization of sound processing of sound sources based upon user perspective changes. Hart, ¶¶28-30. Begault simply provides a user interface that enables configuration of sound sources for subsequent received sound. Begault, 172. Thus, the cited combination does not render the current claim limitation obvious.

6. Independent Claim 9

a. Limitation 9[b]: Determining When In the Zone with WED Worn on Head

Limitation 9[b] recites “determining, with a wearable electronic device (WED) worn on a head of the user, when the user is located inside the zone.” As mentioned above, Petitioner erroneously asserts that Pedrotti teaches that the tracking processor “may be ‘in the HMD’.” Pet. 18. In contrast to Petitioner’s assertion, as explained above, Pedrotti does not teach that the tracking processor may be in the HMD and, indeed, such possibility is incompatible with the boundary determination and HMD techniques disclosed by Pedrotti. *See* §III.B.5.a. Thus, Pedrotti does not teach or suggest tracking when the user is located inside the zone with the WED and the other cited references do not obviate this deficiency of Pedrotti. Accordingly, no *prima facie* case of obviousness has been established by Petitioner with respect to this claim limitation.

b. Limitation 9[c]: Determining When Leaving the Zone with WED Worn on Head

Limitation 9[c] recites “determining, with the WED worn on the head of the user, when the user is leaving the zone.” In contrast to Petitioner’s assertion, as explained above, Pedrotti does not teach that the tracking processor may be in the HMD and, indeed, such possibility is incompatible with the boundary determination and HMD techniques disclosed by Pedrotti. *See* §III.B.5.a. Thus, Pedrotti does not

teach or suggest zonal tracking of a user with a WED worn on the head of a user, let alone specifically tracking when the user is leaving the zone with the WED. Further, the other references do not obviate this deficiency of Pedrotti and Petitioner has not established that they do. Accordingly, no *prima facie* case of obviousness has been established by Petitioner with respect to this claim limitation.

c. Limitation 9[d]: Displaying 3D Image of Zone When Leaving the Zone

Limitation 9[d] recites “displaying, with the WED worn on the head of the user, a three dimensional (3D) virtual image of the zone in response to the WED determining that the user is leaving the zone.” The cited references do not teach or disclose this limitation.

Petitioner asserts that Pedrotti “taught that, based on this determination [that a PED (Pedrotti’s controller) moves outside a zone], its HMD displays ‘a visual warning such as a grid or virtual fence.’” Pet. 26. In contrast to providing a virtual fence “in response to the WED determining that the user is *leaving the zone*,” however, Pedrotti teaches providing the virtual fence “in an area around the point in the virtual world at which the user’s head or hand *has approached the boundary of the selected area*.” Pedrotti, 13:14-17 (emphasis added); Hart, ¶¶42-43. Pedrotti explains that the warning is triggered “when the user’s head and/or hand approaches to within a preselected distance, for example one foot.” Pedrotti, 12:40-45. Thus,

Pedrotti clearly does not teach that the virtual fence is displayed “in response to the WED determining that the user *is leaving the zone*,” as recited by limitation 9[d]. Hart, ¶¶42-43. At best, Pedrotti teaches displaying the virtual fence when the “user’s head or hand *has approached the boundary*.” Pedrotti, 13:17 (emphasis added); Hart, ¶45.

Indeed, Pedrotti suggests alternative actions to displaying the virtual fence when the “user’s head or hands go beyond the boundary.” Pedrotti, 13:63. Specifically, Pedrotti teaches that “the processor can provide additional messaging or warning, such as text or auditory warnings, or an additional visual warning that persists until the user returns to the selected area within the boundary.” Pedrotti, 13:63-66; Hart, ¶44. In the condition of the “user’s head [going] beyond the boundary,” Pedrotti actually suggests that “the processor can cause the HMD to fade to black, and present, for example, only a warning message and/or a beacon for arrows directing the user to move in the direction of the boundary and the selected area.” Pedrotti, 13:63-14:5; Hart, ¶44. Thus, Pedrotti actually teaches away from displaying a three-dimensional virtual image of the zone in response to determining that the user is leaving the zone. Hart, ¶44.

Thus, Pedrotti does not teach or suggest the features of limitation 9[d]. Further, the other references do not obviate this deficiency of Pedrotti. Accordingly,

no *prima facie* case of obviousness has been established by Petitioner with respect to this claim limitation.

7. Independent Claim 17

a. Limitation 17[c]: Head-Worn WED that Wirelessly Communicates with the PED

Limitation 17[c] recites “a wearable electronic device (WED) that is worn on a head of the *user*, wirelessly communicates with the PED.” The cited references do not teach or disclose this limitation.

Petitioner asserts “Pedrotti disclosed multiple controller tracking methods that POSAs would understand are or could be implemented wirelessly, including ‘magnetic, optical, electrical, sonar, radar [and] ultrasonic’ tracking.” Pet. 41-42. However, as mentioned above, Pedrotti does not disclose a tracking processor in the head-worn WED. *See* §III.B.5.a. Instead, Pedrotti teaches a stationary tracker outside that HMD that is used to track the tracker inside the HMD. Pedrotti, 10:42-44. Thus, the type of tracking systems utilized by Pedrotti do not inherently suggest wireless communication between the WED and PED. Indeed, in contrast to wireless communication between the WED and PED, Pedrotti discloses, at best, that the HMD senses from “a local base station” (electromagnetic field source) and provides information relative to the local base station (electromagnetic field source) to the tracking system processor. In contrast to Petitioner’s assertion, there is no teaching

or suggestion in Pedrotti of wireless communication between the HMD and controllers.

Further, Jang does not obviate this deficiency of Pedrotti. The cited portion of Jang merely describes wireless functionality of the communication unit 106. Jang, 7:35-37. However, in contrast to the current claim limitation, which recites wireless communication between the WED and PED, the communication unit 106 serves an entirely different purpose for entirely different components. Specifically, the communication unit 106 “transfers the sound sources delivered through the control unit 104 [of the virtual reality server 100] to the virtual reality apparatus 110.” Jang, 7: 33-34; FIG. 1B. Like Pedrotti, there is no disclosure of wireless communication between the WED and PED, as recited by this claim limitation.

Thus, this claim element is not taught or suggested by Pedrotti. Further, the other references do not obviate this deficiency of Pedrotti. Accordingly, no *prima facie* case of obviousness has been established by Petitioner with respect to this claim limitation.

b. Limitation 17[e]: Head-Worn WED with Sensors that Sense the PED Leaving the Zone

Limitation 17[e] recites that the WED “includes one or more sensors that sense when the PED leaves the zone.” The cited references do not teach or disclose this limitation.

Petitioner relies on the rationale asserted for limitation 2[a]. Pet. 42. Petitioner's assertion that because Pedrotti mentions that trackers may provide information to cameras mounted on the base station or elsewhere, it would be obvious to supply a camera on the HMD for tracking the PED. *Id.* However, as established above, Pedrotti does not teach or suggest a tracking system on the HMD, let alone one that receives PED location information from the PED; but instead teaches a tracker that provides information to the tracking system to track the HMD. §III.B.5.a; Pedrotti; 5:56-59. In contrast to the WED performing tracking functionality, Pedrotti actually teaches the opposite, that the WED is tracked. Pedrotti, 6:3-10 (disclosing that the positions of the HMD/WED and controllers are determined).

There is no indication that the tracking system could be performed in a processor of the HMD and such configuration would be infeasible in Pedrotti. Indeed, to establish the safety boundary, the tracking system processor tracks the location of the user as the user walks around the room. Pedrotti, 14:57-65; Hart, ¶37. As mentioned in Pedrotti, the HMD “covers the eyes of user 102, once user 102 has donned the HMD 106” such that “user 102 can no longer see the surrounding physical world. Pedrotti, 6:23-25; Hart, ¶37. If the HMD were the tracking system, the user would not be able to see the physical world, frustrating the ability of the user to identify and “walk around a perimeter... in which the user can be free to move without risk of collision with objects 1408.” Pedrotti, 14:59-15:3; Hart, ¶37.

Thus, it is clear that Pedrotti does not teach or suggest that the WED includes the tracking system processor/functionality.

Accordingly, Pedrotti clearly does not teach or suggest a WED with sensors that sense when the PED leaves the zone. Further, the other references do not obviate this deficiency of Pedrotti. Accordingly, no *prima facie* case of obviousness has been established by Petitioner with respect to this claim limitation.

c. Limitation 17[f]: Displaying 3D Image of the Zone in Response to the PED Leaving the Zone

Limitation 17[f] recites that the WED “includes a display that displays a 3D virtual image of the zone in response to sensing that the PED leaves the zone.” The cited references do not teach or disclose this limitation.

Petitioner relies on the rationale asserted with respect to limitations 2[b] and 17[e] for this limitation. Pet. 42. However, as established with respect to limitation 9[d], above, the cited references do not teach or suggest displaying a 3D virtual image of the zone in response to determine that the user is leaving the zone. §III.B.6.c. Similar to limitation 9[d], the cited references do not teach or suggest displaying “a 3D virtual image of the zone in response to sensing that the PED leaves the zone,” as recited by limitation 17[f].

Thus, this claim element is not taught or suggested by Pedrotti. Further, the other references do not obviate this deficiency of Pedrotti. Accordingly, no *prima*

facie case of obviousness has been established by Petitioner with respect to this claim limitation.

d. Limitation 17[g]: Head-Worn WED with Sensors that Sense the PED Leaving the Zone

Limitation 17[g] recites “wherein the display displays the 3D virtual image of the zone to warn the user that the user is leaving the zone.” The cited references do not teach or disclose this limitation.

As discussed with respect to limitation 17[f], in contrast to warning the user that the user leaving the zone via display of a virtual fence (analogized as the current claim’s 3D virtual image of the zone by Petitioner), Pedrotti actively teaches the opposite, removing the virtual fence when the user is leaving the zone.

Thus, this claim element is not taught or suggested by Pedrotti. Further, the other references do not obviate this deficiency of Pedrotti. Accordingly, no *prima facie* case of obviousness has been established by Petitioner with respect to this claim limitation.

8. Dependent Claims

As discussed above, Petitioner fails to carry its burden with respect to independent claims 1, 9, and 17. Therefore, based at least upon the virtue of their dependency, Petitioner fails to carry its burden with respect to dependent claims 2-8, dependent claims 10-14, and dependent claims 18-20.

C. Ground 2 Should Not Be Instituted Because the Asserted Prior Art Does Not Teach Using a Wearable Electronic Device to Track Handheld Device.

1. Overview of McCulloch

McCulloch is directed to a near-eye, augmented reality (“AR”) display. The AR display of McCulloch displays virtual objects the user can control with a real controller device, such as a joystick or touchpad. McCulloch, Abstract, claims 1-17. McCulloch explains that users like the tactile feel of physical controller that are usually associated with gaming systems and computers that are traditionally operated on stationary displays despite their lack of realism. *Id.*, 1:6-14. The McCulloch invention makes common physical controllers, such as joysticks or touchpads, compatible with more dynamic head worn AR displays that provide better realism than a stationary display like a television. *Id.*, 1:6-15.

The head mounted AR display (HMD) in McCulloch is either an optical see-through device or video-see device², such as eyeglasses, where the user is able to see

² McCulloch specifically defines a “see-through” device as a device that allows the user to see their environment through an optically transparent lens while being capable of projecting virtual images within the field of view of the user. *Id.*, 3:56-61. McCulloch describes the “video-see” device a device that continually projects

their environment all the time while wearing the HMD. *Id.*, 3:54-4:3; Hart, ¶50. The AR display is tethered wirelessly or by a cable to additional processing or computing elements to perform visual and audio processing. *Id.*, 4:43-49. McCulloch further explains that real controller devices can also enhance realism with AR devices as they can provide sensory feedback. *Id.*, 1:29-33.

To adapt common “real controller devices” for use with AR displays, McCulloch describes various techniques and systems for user eye tracking, hand gesture controls, and communicating over a network with a physical controller. *Id.*, 5:19-36.

McCulloch teaches how to use user inputs from real controller devices to control virtual objects and leverage feedback mechanisms in the real controller devices to enhance the immersive experience for the user. *Id.*, 6:61-66. For example, McCulloch discloses a virtual remote-control helicopter may be displayed in the near-eye, AR display. *Id.*, 12:49-60; Hart, ¶51. The real controller device has a joystick that the user manipulates to control the position of the virtual remote-control helicopter, such as moving the virtual remote-control helicopter to the right, as discussed in connection with Figures 3A and 3B. *Id.*, 13:6-23; Hart, ¶51.

the user’s field of view of the real world to screen(s) in front of the user’s eyes.

Id., 3:61-4:3.

To further the user's immersive experience, McCulloch also teaches how to use eye tracking, gaze data, and hand gestures to select virtual objects or virtual representations of real objects for control with the real controller device without necessitating object selection using the controller. *Id.*, 13:42-45; Hart, ¶52.

McCulloch focuses on controlling virtual object features within a display field of view or a display portion of what a user looks through and is seen from the user's perspective. *Id.*, 4:4-13; Hart, ¶55. The display field of view is defined in terms of a coordinate system that may be acquired using 3D mapping techniques with image data and depth data. *Id.* 11:56-12:17; 15:1-62; Hart, ¶55. As such, the display field of view in McCulloch is only related to the user's perspective view – not a virtual boundary or zone around the user. Hart, ¶55. McCulloch discloses that a user may define boundaries for a “playspace” in which virtual objects, such as the virtual remote-control helicopter, may be positioned. *Id.* 20:4-27. The playspace defines the boundaries of where the virtual objects can be positioned in the user's field of view, and may be automatically determined based on a 3D mapping of the user environment or location. *Id.*; Hart, ¶55.

Because the boundaries of the playspace are defined by the user's field of view, such boundaries change based on the user's present environment. *Id.* 20:13-16 (“For example, the user input data may be image and depth data from a capture

device on the display device captured while a user is turning his head, gaze data captured while the user is gazing at boundary points...”); Hart, ¶55.

McCulloch does not describe a situation in which the user is within the display field of view because McCulloch is directed instead to augmented reality (not virtual reality) where a user can position virtual objects within a playspace within the user’s view. *Id.*, 20:4-18; Hart, ¶¶56-57.

2. There Is No Motivation To Combine Pedrotti and McCulloch.

A POSITA would not be motivated to combine McCulloch’s system with Pedrotti’s method for assisting a user in remaining within a selected area. Hart, ¶59. The motive in McCulloch for defining a playspace with boundaries is unrelated to user safety as within Pedrotti. Hart, ¶59. The critical difference between Pedrotti’s and McCulloch’s motivation is related to how a user interacts with the real world when wearing an HMD or WED. Pedrotti is clear that the HMD it describes completely obstructs the user’s view of the real world making it hazardous to move freely in a real-world space that has obstructions and walls. Pedrotti, 2:25-26; 4:6. Indeed, Pedrotti teaches, “since it is generally considered preferable to present the user with a view of only the virtual world in order to get the desired immersive effect, these physical items are similarly not presented to the user the HMD display.” *Id.*, 11:55-58. In contrast, the McCulloch HMD *always* permits the user to see the real

world while wearing the HMD such that it replicates or does not meaningfully obstruct the user's natural field-of-view ("FOV"). McCulloch, 3:54-4:3. Therefore, there is no need for producing the safety barrier using the McCulloch device, contrary to Petitioner's assertion. Hart, ¶59. Furthermore, the method for setting such a boundary in McCulloch is adequate and environmentally based on the user's needs, eliminating the necessity to add Pedrotti's invention to its system.

The hypothetical scenario Petitioner constructs, a person tripping over a sofa while flying a virtual helicopter³, actually demonstrates why a POSITA would not be motivated to implement Pedrotti as an improvement to McCulloch. Pet. 47.; Hart, ¶60. McCulloch's focus on bringing a more immersive experience to users invokes concepts like force feedback in a real controller device and the use of an AR display to seamlessly blend the real world with virtual elements. Hart, ¶60. The creation of a virtual safety fence is not only counter to the objectives of the McCulloch invention, but also unnecessary. *Id.* First, McCulloch describes an invention that is meant to blur the lines of reality and fiction like as described in Fig. 8D where the user throws a virtual basketball at a real television and the HMD displays a simulated

³ While McCulloch describes an example of flying a virtual remote-control helicopter, McCulloch does not mention any concern of a user colliding with a physical object into that example as Petitioner implies in its Petition.

occluding image of the television being damaged. McCulloch, 29:36-63; Hart, ¶60.

If the user was approaching a couch and a virtual wall were to suddenly appear, this would serve as sudden and violent break with the immersive experience McCulloch is trying to create. Hart, ¶60.

Furthermore, beyond the fact that a user would be able to see the couch wearing the McCulloch HMD in Petitioner's hypothetical, McCulloch specifically teaches using depth sensors on the HMD and other parts of the system to produce a 3D map of the objects in the user's environment. McCulloch also teaches how that depth data and object mapping is used to i) avoid improper visual occlusions between real world and virtual objects, ii) track the HMD within the environment, and iii) track the gaze of the user. Using the object map, McCulloch teaches that its HMD can easily predict a potential collision with a physical object, know whether the object is seen by the user, and alert the user to the presence of the object if necessary. Hart, ¶61.

A POSITA would not be motivated to combine McCulloch's boundary setting method with the Pedrotti boundary method. The boundary method described in McCulloch uses only eye tracking and gaze information when establishing the boundary. This method is reliant on a device that permits the user to see the real world. In contrast, the Pedrotti invention is targeted for a device that *obscures* the real world, where eye tracking and gaze data would not be helpful in identifying a

boundary in the real world. The McCulloch teaching is incompatible with the Pedrotti device and methods. Hart, ¶62.

3. McCulloch, In Hypothetical Combination with Pedrotti and Flaks, Does Not Teach All Elements of the '509 Patent Claims.

Petitioner fails to establish a reasonable likelihood that these asserted references would have rendered the challenged claims obvious.

As discussed in detail below, McCulloch and Flaks do not obviate the deficiencies of Pedrotti discussed in Ground 1 above. Thus, like the combination used in Ground 1, the Ground 2 combination does not establish a *prima facie* case of obviousness.

4. Independent Claim 1

As shown above, Pedrotti does not disclose limitations 1[b] or 1[d] of claim 1. McCulloch and Flaks do not obviate this deficiency discussed in Ground 1 above. Thus, like the combination used in Ground 1, the Ground 2 combination does not establish a *prima facie* case of obviousness.

a. Limitation 1[b]: Determining When In the Zone with WED Worn on Head

As established above, Pedrotti does not teach or suggest a WED determination that “the user is located inside the zone,” as described in limitation 1[b]. §III.B.5.a. Similarly, McCulloch does not teach or suggest this feature.

Petitioner relies on McCulloch's HMD having sensors that can "identify position changes of the head mounted display device" as suggesting this feature. Pet. 53. However, McCulloch does not teach determining when a user is in the zone. Hart, ¶64. While McCulloch does disclose a "location sensing unit 144," this unit identifies a physical location of the user, not a location of the user with respect to a virtual boundary, and thus would not be obvious to combine with Pedrotti's virtual safe area. Hart, ¶68. Indeed, the location sensing unit in McCulloch is described as including a "GPS transceiver, an infrared (IR) transceiver, or a radio frequency transceiver for processing RFID data." McCulloch, 8:17-22; Hart, ¶68. Each of these examples provide a *physical* location without respect to a "virtual space" boundary, as described in Pedrotti. Pedrotti, 12:16-17. Thus, Petitioner's assertion that McCulloch could modify Pedrotti or determine when the user is in Pedrotti's safe area without explaining how McCulloch would be aware of a user's relative position within the zone fails. Pet. 53. Indeed, as explained above with respect to Pedrotti, an external stationary tracking system is required to track the HMD in the virtual space. Neither Pedrotti nor McCulloch teach or even suggest a technique for somehow apprising the HMD of the defined boundary coordinates, let alone how the HMD would use a physical location tracker to determine the user's location with respect to such a boundary, much less whether the user is inside or outside such boundary coordinates.

In contrast to bounding movement via a virtual space boundary to avoid obstacles that the user is unable to see, McCulloch discloses a system where the user is able to see obstacles and interact with them. McCulloch, 13:6-15. As established above, adding Pedrotti's virtual area boundary to McCulloch's system would not enhance but instead frustrate McCulloch's purposes. §III.C.2. In contrast to a rigid virtual area, McCulloch teaches a dynamically changing system that provides "certain quality of experience wherever an application is executed." McCulloch, 23:28-35. Indeed, McCulloch focuses on controlling virtual object features within a display field of view or a display portion of what a user looks through and is seen from the user's perspective. *Id.*, 4:4-13. The display field of view is defined in terms of some coordinate system that may be acquired using 3D mapping techniques with image data and depth data. *Id.*, 11:56-12:17; 15:1-62. As such, the display field of view in McCulloch is only related to the user's perspective view – not a virtual boundary or zone divided from an around the user. Indeed, McCulloch never describes a situation in which the user is within the display field of view because McCulloch requires a view of a play space to allow gaming applications to position virtual objects. *Id.*, 20:4-18.

With this in mind, position tracking relative to a zone is not taught and, indeed, is unnecessary in the context of McCulloch's claimed invention. Accordingly,

McCulloch does not obviate the deficiencies identified in Ground 1 with respect to limitation 1[b].⁴

b. Limitation 1[d]: Playing the Binaural Sound from the Pointed to SLP

As established above, Pedrotti does not teach or suggest “playing, with the WED worn on the head of the user, the binaural sound that emanates from the one of the multiple SLPs in response to the one of the multiple SLPs being pointed at by the PED held in the hand of the user,” as described in limitation 1[d]. §III.B.5.c. Similarly, McCulloch does not teach or suggest this feature.

Indeed, Petitioner uses the same faulty rationale that such playback for selection was well known. Pet. 57. As explained in §III.B.5.c, in contrast to playing based upon *selection*, the current claim recites playing the binaural sound that emanates from the SLP, “in response to [the SLP] *being pointed at*.” There is no teaching or suggestion in Pedrotti or McCulloch of such trigger in playing an SLP’s binaural sound. Accordingly, McCulloch does not obviate the deficiencies identified in Ground 1 with respect to limitation 1[d].

⁴ Petitioner does not rely upon Flaks for any of the limitations discussed herein, and thus, has not established that it obviates the deficiencies established in this POPR.

5. Independent Claim 9

As shown above, Pedrotti does not disclose limitations 9[b], 9[c], or 9[d] of claim 9. McCulloch and Flaks do not obviate this deficiency discussed in Ground 1 above. Thus, like the combination used in Ground 1, the Ground 2 combination does not establish a *prima facie* case of obviousness.

a. Limitation 9[b]: Determining When In the Zone with WED Worn on Head

As established above, Pedrotti does not teach or suggest “determining, with a wearable electronic device (WED) worn on a head of the user, when the user is located inside the zone,” as recited by this limitation. §III.B.5.a. Similarly, as established in §III.C.4.a, McCulloch does not teach or suggest this feature. Accordingly, McCulloch does not obviate the deficiencies in Ground 1 with respect to limitation 9[b].

b. Limitation 9[c]: Determining When Leaving the Zone with WED Worn on Head

As established above, Pedrotti does not teach or suggest “determining, with the WED worn on the head of the user, when the user is leaving the zone,” as recited by this limitation. §III.B.5.b. Similarly, as established in §III.C.4.a, neither Pedrotti nor McCulloch teach or even suggest a technique for somehow apprising the HMD of the HPED defined boundary coordinates, let alone how the HMD would use a physical location tracker of McCulloch to determine the user’s location with respect

to Pedrotti's virtual space boundary, let alone whether the user is inside or outside such boundary. For similar reasons, McCulloch clearly does not teach or suggest techniques for using the HMD to determine when the user is leaving such a zone. Thus, McCulloch and Pedrotti do not teach or suggest this feature. Accordingly, McCulloch does not obviate the deficiencies in Ground 1 with respect to limitation 9[b].

c. Limitation 9[d]: Displaying 3D Image of Zone When Leaving the Zone

As established above, Pedrotti does not teach or suggest the recitation of this limitation. §III.B.6.c. McCulloch does not obviate this deficiency. That is, McCulloch never describes displaying a VR image of the zone, much less displaying the VR image of the zone in response to determining that the user/PED is moving out of the zone. As mentioned above, the augmented reality device in McCulloch provides the advantage of executing a gaming application wherever you are and using your current physical environment based on adaptive virtual environment rules that automatically determines playspace based on current space constraints. McCulloch, 20:4-21. As such, McCulloch always presents the playspace in which virtual objects appear in front of the user wearing the augmented reality device.

With regard to “boundary” points, McCulloch merely mentions that a gaming application may receive user inputs identifying boundaries for a playspace in which

virtual objects may appear using user input data from image and depth data acquired via a capture device while a user is turning his head. *Id.*, 20:11-18. Boundary points may also be captured based on the user's gaze, as detected by the capture device. *Id.* However, these boundary points are not presented to the user in McCulloch. Instead, a 3D mesh used to represent a mapping of an environment surrounding the user is used to automatically determine a playspace for a gaming application. *Id.*, 20:18-25. Otherwise, the only other boundary data depicted in McCulloch is object boundary data that includes edge data or polygon mesh for a real or virtual object – not a zone or playspace area. *Id.*, 19:14-21. Indeed, the only instance in which McCulloch mentions that the user may not view the display field of view, McCulloch describes a collision of a virtual object that may occur outside of the display field of view and a physics engine may still perform collision modeling on the virtual object despite it being outside of view. *Id.*, 27:42-51. As such, in the only instance that McCulloch describes something leaving the playspace, McCulloch does not create any notification, much less a VR image, related to the playspace area.

For at least these reasons, among others, McCulloch and Pedrotti fail to teach or suggest limitation 9[d].

6. Independent Claim 17

As established above, Pedrotti does not disclose limitations 17[e], 17[f], or 17[g] of claim 17. McCulloch and Flaks do not obviate this deficiency discussed in

Ground 1 above. Thus, like the combination used in Ground 1, the Ground 2 combination does not establish a *prima facie* case of obviousness.

a. Limitation 17[e]: Head-Worn WED with Sensors that Sense the PED Leaving the Zone

As established above, Pedrotti does not teach or suggest “determining, with the WED worn on the head of the user, when the user is leaving the zone.” §III.B.7.b. Further, as established in §§III.C.5.a and III.C.5.b, neither Pedrotti nor McCulloch teach or even suggest a technique for somehow apprising the HMD of the HPED defined boundary, let alone how the HMD would use a physical location tracker of McCulloch to determine the user’s location with respect to Pedrotti’s virtual space boundary, much less whether the user is inside or outside such boundary. For similar reasons, McCulloch clearly does not teach or suggest techniques for using the HMD to determine when the user is leaving such a zone. Thus, these references clearly do not disclose a WED with sensors that sense when the PED leaves such a zone, as recited by the current limitation.

In contrast to Petitioner’s assertion that McCulloch discloses an “HMD for detecting and tracking infrared light, which may be emitted by a controller,” McCulloch teaches no such technique. Instead, Petitioner’s cited portion of McCulloch describes how capture devices may capture the viewed physical environment, by “[mapping] real objects in the display field of view... in the field

of view of the user.” McCulloch, 7:31-33. McCulloch does not describe that the capture device 113 somehow tracks the controllers. Indeed, with respect to controller position, McCulloch is silent regarding obtaining the location of the controllers, let alone via the HMD. At best, McCulloch teaches that inertial motion (speed, acceleration and direction of motion) is determined by sensors in the controller, for a wholly different purpose of controlling virtual objects; without any regard to determining the location. McCulloch, 29:40-43; Hart, ¶63. Further, there is no discussion as to how the HMD might detect the PED’s location. Because McCulloch does not disclose tracking the controller’s location, it clearly does not disclose determining when the controller leaves a zone, let alone via a WED. Instead, at best, inertia identified by the controllers themselves may be used to affect a virtual object within the field of view (e.g., in front) of the user. McCulloch, 29:6-12. Accordingly, McCulloch does not obviate the deficiencies in Ground 1 with respect to limitation 17[e].

b. Limitation 17[f]: Displaying 3D Image of Zone When Leaving the Zone

As established above, Pedrotti does not teach or suggest the recitation of this limitation. §III.B.7.d. Petitioner asserts that “[a] McCulloch system implementing Pedrotti’s safe area method would have rendered obvious [this] limitation.” Pet. 58-59. However, as established above, Pedrotti does not display the zone when leaving

the zone, but instead displays a portion of the zone when approaching the zone boundary. Further, as discussed in §III.C.2, there is no motivation to combine the references in this way. Thus, Petitioner's combination does not disclose displaying an image of the zone when leaving the zone and would frustrate the purposes of McCulloch. Accordingly, McCulloch does not obviate the deficiencies in Ground 1 with respect to limitation 17[f].

c. Limitation 17[g]: Displaying 3D Image of Zone When Leaving the Zone to Warn the User

As established above, with respect to limitation 17[f], the Pedrotti and McCulloch combination does not teach or suggest displaying a 3D image of the zone when leaving the zone. *See also* §III.B.7.d. In contrast to warning a user when a user is leaving a virtual zone, McCulloch envisions free-flowing movement from room-to-room and/or location-to-location. McCulloch, 6:1-10. Thus, adding in Pedrotti's virtual boundary, as suggested by Petitioner, would hinder this ability to move from room-to-room and/or location to location. Thus, McCulloch does not obviate the deficiencies in Ground 1 with respect to limitation 17[g].

7. Dependent Claims

As discussed above, Petitioner fails to carry its burden with respect to independent claims 1, 9, and 17. Therefore, based at least upon the virtue of their dependency, Petitioner fails to carry its burden with respect to dependent claims 2-8, dependent claims 10-14, and dependent claims 18-20.

IV. The Board Should Exercise Discretion Under 35 U.S.C. § 314 to Deny Institution

Institution of *inter partes* review is always discretionary. 35 U.S.C. §314(a).

The Board should exercise its discretion under §314(a) to deny institution here.

A. The Board should exercise its discretion to deny institution of this Petition.

The Board should deny institution under §314(a) in view of its precedential decisions in *NHK Spring*⁵ and *Fintiv*⁶ because the district court and parties have already expended substantial time and resources, a stay is unlikely, and a final written decision (“FWD”) in this proceeding is expected no earlier than January 2025, at least five months after the jury trial begins in August 2024. The ’509 Patent is involved in the related matter, (Pet. 71), that involves substantially the same issues, arguments, and evidence that Petitioner has presented in the Petition. Petitioner gives little attention to the discretionary issues in the Petition and provides no *Sotera* stipulation resulting in an overlap of invalidity issues. Pet. 70-71.

⁵ *NHK Spring Co., Ltd., v. Intrix-Plex Techs., Inc.*, IPR2018-00752, Paper 8 (PTAB Sep. 12, 2018) (precedential).

⁶ *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (“*Fintiv*”) (precedential).

Duplicating the district court's efforts would not be an efficient use of the Board's resources and would not serve to fulfill the primary purpose of AIA proceedings: to provide a practical and efficient alternative to district court litigation.

In *NHK Spring* the Board denied institution primarily because the related district court case was nearing its final stages and would resolve all the issues before the Board. *NHK Spring*, Paper 8 at 20; *see also id.*, 11-18 (applying discretion under 35 U.S.C. §325(d)). Other cases—relying on *NHK Spring*—have also denied institution. For example, in *E-One, Inc. v. Oshkosh Corp.*, the Board applied *NHK Spring*'s analysis under 35 U.S.C. §314(a) to deny institution. IPR2019-00161, Paper 16 (PTAB May 15, 2019). In *E-One*, the Board reasoned:

[i]n the § 314(a) portion of its analysis, [*NHK Spring*] noted that a district court proceeding involving the same patent was scheduled to go to trial before a final decision would have been due in the Board proceeding, and the Board proceeding would involve the same claim construction standard, the same prior art references, and the same arguments as in the district court.

Id., 6. In both *NHK Spring* and *E-One*, factors warranting a denial of institution included: the district court investing considerable time and resources to handle the same issues presented in the IPR, and trials that were scheduled to be completed prior to a Board's FWD. The facts here warrant denial just as decided in *NHK Spring*

and *E-One*. Further, the Petition will not serve as an “effective and efficient alternative” to litigation, frustrating a primary objective of the AIA. *Gen. Plastic Indus. Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 at 16–17 (PTAB Sept. 6, 2017) (precedential).

In *Fintiv*, the Board emphasized six factors to consider under *NHK Spring* which are discussed below. *See Fintiv*, Paper 11 at 5-16. The Board stated that “[t]hese factors relate to whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding.” *Id.*, 6. Here, each of these factors favors denial of institution of this Petition. Because the overall balance of factors favors denial of institution, the Board should apply its discretion under 35 U.S.C. §314(a) to deny institution of the requested proceeding.

1. Factor 1 weighs against institution, because no court has granted a stay and no evidence exists that a stay may be granted.

The parallel district court proceeding has not been stayed. That proceeding includes a total of nine patents-in-suit, and Petitioner has filed Petitions against all patents-in-suit. The motion for inter-district transfer noted in the Petition (Pet. 70) was recently denied. Ex. 2009.

The district court has not indicated whether it would grant a stay if *inter partes* review is instituted, and the Board should decline to speculate whether the district

court would grant a stay in this proceeding. *See, eClinicalWorks, LLC v. Decapolis LLC*, IPR2022-00229, Paper 10 at 8 (April 13, 2022) (“We will not attempt to predict, based on the facts in allegedly similar prior situations, how the Texas District Court would rule should a stay be requested in the WDTX Cases.”).

There is no evidence a stay may be granted if trial is instituted. This factor is at least neutral or weighs in favor of discretionary denial of institution.

2. Factor 2 weighs against institution, because trial in the district court is scheduled to begin months before the final written decision deadline.

Trial is set to begin in the parallel district court proceeding in August 2024. Ex. 2004 at 3. This date has remained unchanged. This trial date is currently at least five (5) months before an expected January 2025 FWD would issue in this IPR. Proceedings with similar substantial gaps between trial and FWD have found Factor 2 weighs in favor of denying institution. *See GlobalFoundries Inc. v. UNM Rainforest Innovations*, IPR2020-00984, Paper 11 at 11-16 (PTAB Dec. 9, 2020) (finding that a scheduled trial date four months before the statutory deadline for a final written decision was a factor weighing in favor of discretionary denial); *NanoCollect Biomedical, Inc. v. Cytonome/ST, LLC*, IPR2020-00551, Paper 19 at 16 (PTAB Aug. 27, 2020) (same); *U.S. Venture, Inc. v. Sunoco Partners Marketing & Terminals, L.P.*, IPR2020-00728 Paper 10 at 9 (PTAB October 1, 2020) (three or four months before issuance of final written decision). Here, just as in *NHK Spring*,

“[i]nstitution of an inter partes review under these circumstances would not be consistent with ‘an objective of the AIA ... to provide an effective and efficient alternative to district court litigation.’” *NHK Spring*, Paper 8 at 20. As the Board recognized in *Fintiv*, “[i]f the court’s trial date is earlier than the projected statutory deadline, the Board generally has weighed this fact in favor of exercising authority to deny institution under *NHK*.” *Fintiv*, IPR2020-00019, Paper 11 at 9.

Importantly, there is no evidence that the parties’ trial will be extended, let alone delay of trial would extend past the statutory deadline for the FWD. *See Cisco Systems, Inc. v. Oyster Optics, LLC*, IPR2021-00319, Paper 9 at 10-12 (PTAB Jun. 8, 2021) (weighing *Fintiv* factor 2 in favor of exercising discretion to deny Petition).

In sum, there is no reason to believe the August 2024 trial will be postponed. *See Fintiv*, Paper 11 at 13 (“We generally take courts’ trial schedules at face value absent some strong evidence to the contrary.”); *see also, Cisco Systems, Inc. v. Monarch Networking Solutions, LLC*, IPR2020-01227, Paper 11 at 9-11 (PTAB Mar. 4, 2021) (declining to speculate whether the district court will grant the pending motion to transfer and weighing *Fintiv* factor 2 in favor of denial of institution).⁷

⁷ This timing continues to hold under the guidance in the Director’s June 21, 2022, memo titled “Interim Procedures for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation” (“*Fintiv* Memo;” Ex. 2006).

Without a stay pending IPR, litigation continues, and there will be a continued expenditure of court resources. This factor weighs in favor of discretionary denial of institution.

3. Factor 3 weighs against institution, because the court and parties have and will continue to invest significant time and resources in the parallel proceeding.

The district court action was filed June 3, 2022, and served June 13, 2022. A scheduling order has been in place since November 14, 2022. The Petition was filed on June 9, 2023. Pet. 73. Since then, the district court and parties have invested significant time and resources. In *Fintiv*, the Board stated, “if, at the time of the institution decision, the district court has issued substantive orders related to the patent at issue in the petition, this fact favors denial. Likewise, district court claim construction orders may indicate that the court and parties have invested sufficient

The *Fintiv* Memo directs the Board to “consider the median time from filing to disposition” in the district court (Ex. 2006 at 3), which for patent cases in the Western District of Texas is 25.4 months (Ex. 2007), and for patent cases before Judge Albright is 24.7 months (Ex. 2008). Counting from the June 3, 2022, filing of the parallel district court case results in an average time to trial before the end of August 2024, precisely in line with the scheduled August 2024 trial and roughly five months before any expected FWD here.

time in the parallel proceeding to favor denial” of institution. *Fintiv*, Paper 11 at 9-10. Further, “[t]his investment factor is related to the trial date factor, in that more work completed by the parties and court in the parallel proceeding tends to support the arguments that the parallel proceeding is more advanced, a stay may be less likely, and instituting would lead to duplicative costs.” *Id.*, 10.

The investment by the parties and the court will be significant by the time either an institution decision or a FWD is issued. Petitioner waited nearly a full year—literally at the last minute—to file this Petition. ***Prior*** to filing this POPR, the parties have (1) completed Claim Construction briefing after depositions, (2) received the Court’s ruling on Petitioner’s motion to transfer after related discovery and depositions, (3) conducted the Markman hearing, and (4) received claim constructions (the Court’s procedure is to provide preliminary construction shortly in advance of the Markman hearing and then provide final constructions at the hearing). Ex. 2005 (setting Markman hearing for October 3, 2023).

By the time an institution decision is rendered in January 2024, the parties will have (1) exchanged Final Infringement and Invalidity Contentions, and (2) engaged in a substantial portion of fact discovery, which opened October 5, 2023 and closes within four months thereafter. Ex. 2005; Ex. 2004 at 2. Further, the fact that the parallel district court proceeding opens fact discovery just weeks after claim construction does not change this analysis. *Universal Elecs., Inc. v. Universal*

Remote Control, Inc., 943 F. Supp. 2d 1028, 1031-32 (C.D. Cal. 2013) (“That the schedule in this case set discovery to occur after claim construction does not mean that the case remains in its procedural infancy until discovery is well underway.”). The district court action has and will proceed with significant costs to 8KHZ by the time an institution decision is rendered. This factor weighs in favor of discretionary denial of institution.

4. Factors 4-6 weigh against institution, because there is significant overlap between this IPR and district court proceedings, the parties involved are the same, and the asserted grounds fail.

The dispute in this proceeding and the district court case involves the same parties and overlapping issues. (Factors 4 and 5). Petitioner and 8KHZ are parties in the parallel district court litigation. Petitioner has presented substantially the same art and grounds of unpatentability in this Petition that it is asserting in the district court case – that the claims of the ’509 Patent are allegedly obvious over at least the prior art Pedrotti, Begault, and McCulloch. Ex. 2003 at 216-246. Thus, the claims and prior art addressed by PTAB will not materially differ from what is being addressed in the parallel district court litigation. Conducting proceedings in both the PTAB and district court with substantially similar prior art creates the potential of two different outcomes, leading to inconsistent results.

Petitioner has also not stipulated or withdrawn any invalidity positions raised at the district court that are also brought before the Board. Importantly, Petitioner has failed to make a stipulation in the Petition in full accordance with *Sotera* and has not filed such a stipulation in the district court.

Because the district court will address substantially the same issues, arguments, and evidence months before the Board's FWD would be due, instituting review here would not efficiently use the Board's resources, nor would it be an effective and efficient alternative to district court litigation.

The Board noted in *Fintiv* with respect to Factor 6 that:

[I]f the merits of a ground raised in the petition seem particularly strong on the preliminary record, this fact has favored institution.... [I]f the merits of the grounds raised in the petition are a closer call, then *that fact has favored denying institution* when other factors favoring denial are present.

Fintiv, IPR2020-00019, Paper 11 at 14-15. As shown above, the Petition fails on the merits for numerous reasons. These weaknesses, and the Factors addressed above, weigh in favor of discretionary denial of institution.

V. CONCLUSION

For the foregoing reasons, institution of this IPR should be denied.

Date: October 12, 2023

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. §42.24(d), the undersigned hereby certifies that the foregoing Patent Owner's Preliminary Response contains 13,629 words using the word count feature of Microsoft Word.

Dated: October 12, 2023

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §42.6(e), the undersigned hereby certifies that the above-captioned Eight KHZ LLC's Patent Owner Preliminary Response, and its cited exhibits, were served via electronic mail, as authorized by Petitioner's Mandatory Notices, on June 9, 2023 at the following email correspondence addresses of record:

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