

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.,
Petitioner,

v.

EIGHT KHZ, LLC,
Patent Owner.

Case IPR2023-01019
Patent 10,368,179 B1

PATENT OWNER'S PRELIMINARY RESPONSE

35 U.S.C. §313, and 37 C.F.R. §42.107(a)

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EXHIBIT LIST

Ex.	Description
2001	Defendants' Preliminary Invalidity Contentions
2002	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. Jun. 3, 2022), Granting Motion to Extend Scheduling Order Deadlines
2003	Memorandum from Katherine K. Vidal on Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (June 21, 2022)
2004	Lex Machina, Patent Cases (All Judges) Time to Trial, U.S. District Court for the Western District of Texas, September 9, 2023
2005	Lex Machina, Patent Cases (Judge Alan D. Albright) Time to Trial, U.S. District Court for the Western District of Texas, September 9, 2023
2006	Declaration of Dr. Durand R. Begault regarding U.S. Patent Nos. 10,368,179 and 10,448,184
2007	Curriculum Vitae (CV) of Dr. Durand R. Begault

Patent Owner Eight KHZ, LLC (“8KHZ”) submits this Preliminary Response (“POPR”) to the Petition for *inter partes* review (“IPR”) of claims 1, 3-4, 6-10, and 14-19 of U.S. Patent No. 10,368,179 (“’179 Patent”). Paper 2 (“Pet.”).

I. INTRODUCTION

A. The ‘179 Patent

The ‘179 Patent is titled “switching Binaural Sound,” and was issued by the United States Patent and Trademark Office (“PTO”) on July 20, 2019. Ex. 1001.

1. The ‘179 Patent discloses and claims a novel system and technique for modifying binaural audio when a user is detected as leaving an environment by a wearable device.

The ‘179 Patent is generally directed providing binaural sound to a user using a head mounted display (HMD), such as in a virtual reality environment, and altering the binaural sound after an event occurs. Ex. 2006, (Begault) ¶¶7-8 and 12-14.

‘179 Patent, 2:29-67. The sound localization technology described in the ‘179 Patent has applications in “augmented reality (AR), virtual reality (VR), ... and a host of other applications.” ‘179 Patent, 2:50-55.

As described in the ‘179 Patent, binaural sound provides a user, such as a user in a virtual environment, “with a superior ability to localize sounds in the 3D environment” because binaural sound accounts for “small differences to sound that arrives at one ear compared to sound that arrives at the other ear.” ‘179 Patent, 2:43-

3:9. Thus, when a user wears the HMD, the user experiences generated binaural sound, which enhances the user experience.

Figure 2 of the '179 Patent describes that sound is provided at an SLP to a user in binaural sound, then it is determined to change the sound from binaural sound to stereo sound, mono sound, or altered binaural sound. The sound is then changed from binaural sound to stereo sound, mono sound, or altered binaural sound and finally, the stereo sound, mono sound, or altered binaural sound is provided to the user. '179 Patent, 7:31-10:2. The determination to change the sound from binaural sound to stereo, mono, or altered binaural sound may be made in response to an event. The '179 Patent provides numerous examples of events that may trigger an action that alters the provided binaural sound. '179 Patent, 8:47-58, 8:59-9:4. For instance, events include “a change in the ability to detect ... position in a physical or a virtual environment, or a change in the ability to detect an environment.” '179 Patent, 28:9-18.

The three independent claims of the '179 Patent each provide recitations regarding warning/alerting the user that the user is leaving the virtual environment by changing the processing of the binaural sound. Claim 1 requires that the processing of the binaural sound is changed by “filtering ... the binaural sound to alter audio cues to prevent the user from experiencing external localization of the sounds.” Claim 7 requires that the processing of the binaural sound is changed by

“altering processing of the sound ... to degrade audio cues in order to prevent the user from experiencing external localization of the binaural sound.” And Claim 14 requires that the processing of the binaural sound is changed by “reducing a volume of the binaural sound that localizes from [a] virtual image and that is being provided to the user.” In addition, each of the independent claims requires sensing/determining when the user leaves the environment using the WED.

None of the prior art references disclose or suggest these limitations.

II. THE ASSERTED GROUNDS

Petitioner asserts the challenged claims are unpatentable based on the following grounds:

Challenged Claims	35 U.S.C. §	References(s)/Basis
1, 3-4, 6-10, and 14-19	103	Clement (Ex. 105), Osman (Ex. 106), Sauk (Ex. 107)
1, 3-4, 6-10, and 14-19	103	Lyren (Ex. 108), Reif (Ex. 109)

Pet. 2. Petitioner supports the grounds with the Declaration of Agnieszka Roginska, PhD (Ex. 1003).

A. Person of Ordinary Skill in the Art

For purposes of the POPR, 8KHZ applies Petitioner's characterization of a POSITA.

B. Claim Construction

For purposes of the POPR, 8KHZ raises no claim construction issues.

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

A. Institution Standards

Review cannot be instituted unless the Petition demonstrates a reasonable likelihood that at least one of the Challenged Claims is unpatentable. 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).

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 (1996)). “To satisfy its burden of proving obviousness, a petitioner cannot employ merely 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 “factual inquiry” into the reasons for “combin[ing] references must be thorough and searching, and the need for specificity pervades.” *In re NuVasive, Inc.*, 842 F.3d 1376, 1381-82 (Fed. Cir. 2016) (internal quotations and citations omitted). The specific reasoning must include some rational 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.

Petitioner asserts two obviousness grounds of unpatentability. Pet. 2. For the purpose of this POPR, the Board need only consider the validity of independent claims 1, 7, and 14 of Grounds 1 and 2. As shown below, the Petition fails to establish a reasonable likelihood that Petitioner will prevail. A trial therefore should not be instituted.

B. The Petition Should Not be Instituted on Ground 1 Because the Prior Art Fails to Disclose or Teach the Invention as Claimed.

1. Clement

Clement relates to a system that detects when a user is “approaching a boundary of a tracking area” and initiates a “transition out of the virtual world and into the real world.” Clement, abstract. The transition may include fading from presenting virtual world audio to ambient sounds of the real environment. Clement, 9:20-31. Clement provides, for example, that when transitioning from the virtual world to the real world, “audio content associated with the virtual world may fade out, accompanied by a fade in of ambient sound.” *Id.*, 9:22-23. Clement does not disclose or teach that the virtual world audio is binaural. Ex. 2006, (Begault) ¶¶24-31. Clement also does not disclose or teach warning/alerting the user that the user is leaving the virtual environment by providing alterations of binaural audio and/or alterations of sound processing that produces binaural audio. *Id.* In addition, Clement does not teach or disclose determining, *with the WED*, when the user is leaving the environment.

2. Osman

Osman relates to techniques for simulating the source of sound. Osman, abstract. To provide sound localization, Osman discloses use of HRTFs. Osman, 4:48-67. Osman teaches that “a good HRTF model” is more important to “improve the accuracy of sound localization for objects outside the field of display” than

visible objects, because “the brain uses the visual information to identify the sound origin” and “when the sound originates outside the field of view, the extra visual cue for sound localization is lost.” Osman, 7:31-42.

3. Sauk

Sauk relates to techniques for “producing, combining, and customizing virtual sound environments to provide the user with understandable information regarding their surroundings.” Sauk, 2:45-49. Sauk does not disclose virtual reality applications for the invention but does teach replacing audio signals heard by users in the real-world to simulate the “cocktail party effect.” That is, users in a particular user group communicate using binaural audio, which allows the users to focus on each other, while audio from users in a different group communicate using mono- or stereo-audio.

Sauk provides an example application of a military reconnaissance mission involving groups of soldiers. In the example, each group of the four groups could select their own binaural environment, instead of listening to all the various conversations occurring in the communication network. In this way, the soldiers of one group would be aware of each group member’s location, based on the binaural audio, even after losing sight of each other. Sauk, 10:47-62.

To implement this concept, Sauk discloses a signal including metadata and enunciation data that enables the sound reproducer to reproduce a particular format

of audio for a particular relevancy of data. For example, the most relevant enunciation data may be reproduced in binaural audio (e.g., voices of soldiers in same group), while less relevant enunciation data may be reproduced in stereo or mono (e.g., other soldiers of other groups). Sauk, 10:63-11:24; Begault, ¶32.

Specifically, Sauk discloses a binaural sound system that receives a signal that includes: 1) enunciated data to be audibly enunciated to a user and 2) metadata that includes a) a characteristic of the enunciated data and b) spatial position information associated with the enunciated data. Sauk, 2:49-59; Begault, ¶32. The binaural sound system then reproduces the enunciated data as audio in accordance with a predetermined audio enhancement based on the metadata. Sauk, 2:61-64; Begault, ¶32.

The audio enhancement may include selecting an audio reproduction format (e.g., monophonic, stereophonic, or binaural) based upon the metadata. Sauk, 3:8-23. For example, the selected format may be chosen based upon the metadata indicating an association with the binaural audio environment, a source of the enunciated data, or a relevancy specified by the metadata. Sauk, 3:30-40. Sauk discloses these techniques of generating reproductions with particular formats can be utilized to combine audio dimensions (formats) of different audio, resulting in some dimensions without localization cues for that audio. Sauk, 11:26-41.

Notably, Sauk does not teach or suggest that prior reproductions made in one format and/or the processing that generates these prior reproductions are somehow altered. Further, Sauk does not change formatting states based upon changes in the listener's position with respect to the environment. Begault, ¶¶33-34. Instead, Sauk “combines a plurality of audio dimensions.” Sauk, 11:28-30.

In addition, Sauk does not disclose or teach altering binaural sound to alert or warn a user about leaving a virtual environment or virtual image. Begault, ¶35. To the contrary, Sauk discloses generating a signal that includes enunciated data and metadata used to *generate a new binaural format* reproduction that enables a user to ascertain a direction of a real-world associated hazard, for example a biological, nuclear, or chemical hazard. Sauk, 12:14-51; Begault, ¶35. Sauk provides, for example, that the earcon would translate the receive enunciated data to a phrase like, “chemical toxin detected, stay away!” and would be heard “*in the soldier's 3-D sound environment*” to ascertain a direction of the associated hazard and know which direction to move away. Sauk, 12:14-51; Begault, ¶35.

4. Clement, Osman, and Sauk do not render obvious any claim of the ‘179 Patent.

Petitioner has failed to show a reasonable likelihood of success that Clement, Osman, and Sauk, alone or in hypothetical combination, teaches or renders obvious each and every limitation of the challenged claims in the ‘179 Patent. Regarding

claims 1 and 7, none of the references teach or suggest warning or alerting a user *that the user is leaving an environment by filtering or altering binaural sound*. To the contrary, the combination of Clement’s fading out technique and Sauk’s notification alerts *teaches away* from filtering or altering binaural sound to warn or alert a user that the user is leaving the environment. Begault, ¶¶39-40.

Further, regarding claims 1, 7, and 14, the combination of Clement, Osman, and Sauk fails to teach or suggest determining, *with a wearable electronic device (WED)*, when a user is leaving an environment. Clement merely teaches using a tracking device or sensor to determine that the user is leaving the environment. Further, Clement teaches using a head mount display to detect a user’s proximity to a physical border – not when the user is leaving an environment.

In view of these deficiencies, Petitioner has not met its burden of showing there is “a reasonable likelihood that the petitioner would prevail with respect to at least one of the claims challenged in the petition under any ground.” As such, the Board should deny institution.

5. Independent Claim 14

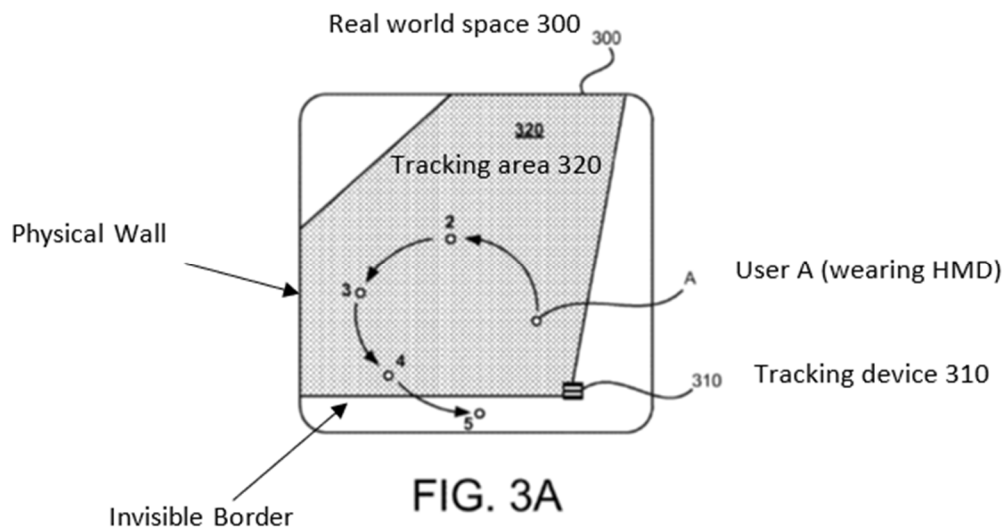
- a. Clement and Osman fail to teach determining, *with a wearable electronic device (WED)*, when a user is leaving an environment of limitation 14[d].**

Limitation 14[d] recites, *inter alia*, “determining, *with the WED*, when the user is leaving the environment.” Petitioner alleges Clement alone teaches limitation

14[d]. Pet. 22-23. Clement and Osman fail to teach a *wearable electronic device (WED)* that determines when a user is leaving an environment.

Although Clement's HMD (a WED worn on the head) is described as being able to detect a user's proximity to a boundary of a tracking area 320, Clement fails to disclose how the sensors of the HMD would detect "***when the user is leaving the environment***" based on a proximity to a boundary of the tracking area 320 *with the HMD*. Instead, Clement merely discloses the tracking device 310 ***for tracking a user's position within the tracking area 320*** and using the HMD for ***tracking a user's proximity to physical obstacles***, such as a wall. ***In other words, the HMD of Clement does not detect when the user is leaving the tracking area 320.***

Clement defines the tracking area 320 as a field of view and range of *the tracking device 310*. Clement, 4:26-29. Further, the tracking device 310 is "positioned in a physical, real world space 300, and is oriented to capture as large a portion of the space 300 as possible with its field of view." Clement, 4:21-26. FIG. 3A of Clement (reproduced below with context added) illustrates the tracking area 320 as defined by the field of view of the tracking device 310.



Clement, FIG. 3A. (textual labels added).

As shown in FIG. 3A, the user A is immersed in a virtual world and may move in a real-world space 300 between positions 1-5, which may be translated into corresponding movements in the virtual world. Clement, 4:49-5:16. At position 3, the user A is within the tracking area 320 but close to a boundary of the real-world space 300, such as a physical wall (context added in reproduced figure above). *Id.* At position 5, the user A has crossed the boundary of the tracking area 320 and thus out of the virtual world. *Id.*, 6:44-51. As such, the boundary of the tracking area 320 is defined by a physical boundary of the real-world space 300 (e.g., physical wall) and *an invisible border* (context added in reproduced figure above) defined by the view of the tracking device 310.

To leave the environment in Clement, (i.e., to leave the tracking area 320), user A must cross the invisible border, as user A cannot walk through the physical wall. That is, the user A is confined to the tracking area 320 by the physical wall and can only leave the environment defined by the tracking area 320 via the invisible border.

The HMD in Clement cannot determine when user A is leaving the environment (i.e., crossing the invisible border). The sensors of the HMD in Clement are only able to detect a proximity to *physical boundaries of the tracking area 320*. That is, the sensors of the HMD in Clement are defined as including a light sensor, a proximity sensor, an audio sensor, and a camera. *Id.*, 11:52-57. These sensors are capable of detecting the user's proximity to *a physical boundary* based on detected light, proximity, audio, or image data, not to the invisible border.

Only *the tracking device 310* can *determine when the user is leaving the environment by crossing the invisible boundary*, as recited in claim 14, not the HMD. Indeed, Clement never explains how the HMD could determine when the user A is leaving the environment given that it is *the tracking device 310* that defines the environment (i.e., tracking area 320). In other words, Clement fails to teach or suggest “determining, *with the WED*, when the user is leaving the environment,” as recited in limitation 14[d].

Indeed, Clement describes using a tracking system *separate from the HMD* to detect when the user is within a proximity of a boundary of a tracking area throughout its disclosure. Clement, 1:31-42, 43-50; 4:15-19, 21-29; 49-53; 5:41-44, 55-60. Moreover, Clement only describes the HMD or the tracking device 310 as detecting when the user is approaching a proximity or threshold to a boundary of the tracking area 320. Because the sensors of the HMD in Clement are only able to detect *physical barriers* of the real-world space 300 and cannot detect when the user leaves the field of view of the tracking device 310 (e.g., invisible border), the HMD in Clement cannot be said to teach “determining, *with the WED*, when the user is leaving the environment,” as recited in limitation 14[d].

For the foregoing reasons, Petitioner failed to carry its burden as to this limitation.

6. Dependent Claims 15-20

As discussed above, Petitioner fails to carry its burden with respect to independent claim 14. Therefore, based at least upon the virtue of their dependency from claim 14, the Petitioner fails to carry its burden with respect to dependent claims 15-20.

7. Independent Claim 7

- a. Clement and Osman fail to teach determining, *with a wearable electronic device (WED)*, when a user is leaving an environment of limitation 7[d].**

Limitation 7[d] recites, *inter alia*, “determining, *with the WED*, when the user is leaving the environment.” Petitioner fails to clearly identify the prior art that allegedly invalidates claim 7, providing confusing internal cross-references to broad discussions of parts of claim 14. Pet. 27-28. As mentioned above, Petitioner fails to meet his burden with regard to Clement and Osman teaching a *wearable electronic device (WED)* that determines when a user is leaving an environment. That is, the sensors of the HMD in Clement would not detect its proximity to a boundary of the tracking area 320; and instead only the tracking device 310 tracks a user’s position within the tracking area 320.

Indeed, as discussed above, the boundary of the tracking area 320 is defined by a physical boundary of the real-world space 300 (e.g., visible wall) and *an invisible border* defined by the view of the tracking device 310. As such, the user cannot *leave* the corresponding environment through the physical border (e.g., wall) of the real-world space 300 but can leave the environment defined by the tracking area 320 via the invisible border. However, since the invisible border is defined only by the view of the tracking device 310, Clement only teaches the *tracking device*

310 as being able to *determine when the user is leaving the environment*, not the HMD.

b. Clement, Osman, and Sauk fail to teach alerting a user by altering processing of binaural sound to degrade audio cues to prevent external localization of the binaural sound of limitation 7[e].

Clement, Osman, and Sauk, fail to teach at least limitation 7[e], as recited in claim 7. Indeed, none of the cited references mentions *alerting the user that the user is leaving the environment by altering processing of binaural sound to degrade audio cues to prevent the user from experiencing external localization of the binaural sound*. Further, the combination of Clement and Sauk ***teaches away*** from *alerting the user* that the user is leaving the environment by *degrading binaural sound*.

i. Clement, Osman, and Sauk fail to teach altering processing binaural sound.

With regard to limitation 7[e], Petitioner referred to the arguments presented with respect to element 14[e] and claims 15 and 16 but failed to recognize the unique recitations of limitation 7[e]. Pet. 28. Indeed, with regard to claim 15, Petitioner argued that Clement teaches “degrading” sound by fading out the sound or reducing its volume. Pet. 8. However, limitation 7[e] does not recite degrading binaural sound. Instead, it is noted that limitation 7[e] should be interpreted with context provided in limitations 7[c] and 7[e]. Indeed, limitations 7[c-e] recite, *inter alia*,

“*processing*, by a digital signal processor (DSP), sounds with the HRTFs to *generate binaural sound in empty space* that is provided to the user and *that externally localizes to the empty space and to the virtual image* in the environment,” “*determining*, with the WED, *when the user is leaving the environment*,” and “alerting the user that the user is leaving the environment by *altering processing of the binaural sound to degrade audio cues in order to prevent the user from experiencing external localization of the binaural sound*.” (Emphasis added.) That is, limitation 7[e] requires altering *processing* of the binaural sound previously generated to provide sound localization in an empty space to a virtual image, such that the audio cues are degraded to prevent the user from experiencing the binaural sound corresponding to the virtual image in the environment. Further, this processing is performed in response to *determining when the user is leaving the environment*. ***Altering audio cues*** to prevent a listener from experiencing external localization of the binaural sound (‘179 patent, 5:24-26, 33-36, 42-48.) is not the same as reducing the volume of the binaural sound because binaural sound with reduced volume would still have audio cues that provide sound localization. Indeed, “[a] mere ‘fade out’ of virtual audio, as described in Clement, does not inherently involve or suggest ‘degrading the sound’ or ‘degrading a spatial cue,’ as a mere lowering of volume of virtual audio does not ‘alter[] processing of the sound by the DSP to degrade a spatial cue.’ Begault, ¶41. Since Clement merely describes

“fading out audio content associated with a virtual world,” Clement cannot be asserted as teaching *degrading audio cues of previously generated binaural sound*, as recited in limitation 7[e]. Indeed, Clement never mentions binaural sound.

Further, Sauk fails to cure Clement’s deficiency with respect to alerting the user that the user is leaving the environment by *altering processing of binaural sound of a virtual image in an empty space of an environment to degrade audio cues to prevent external localization of the binaural sound*. Petitioner relies upon Sauk’s description of its selective filtering techniques, which provides a user the ability to change certain audio formats for different sound sources from binaural to monophonic or stereophonic to signify different levels of relevance. Sauk, 11:27-41. However, the change to certain audio formats described in Sauk does not involve altering processing previously generated binaural audio in response to a change in a user’s position in an environment. Begault, ¶33. Instead, Sauk includes metadata with enunciation data that enables a sound reproducer to *reproduce* a particular format of audio for a particular relevancy of data, as indicated in the metadata. Begault, ¶35. For example, the most relevant enunciation data may be reproduced in binaural audio (e.g., users within the same group), while less relevant enunciation data may be reproduced in stereo or mono (e.g., users in different groups). Sauk, 11:60-12:3.

Sauk's selective filtering feature provides a user the ability to change a particular audio format from being *generated in* binaural to being *generated in* monophonic or stereophonic to signify different levels of relevance. Sauk, 11:27-41. That is, based on a user's selection to make certain audio sources more relevant than others, Sauk uses *pre-defined characteristics from received metadata* (e.g., whether audio from another user's device is part of the same group as the receiving user's device) to determine whether the audio data meets relevancy criteria for a particular reproduction audio format. Sauk, 11:42-66; Begault, ¶34. If the criteria and metadata indicate a high level of relevancy (e.g., the users' devices are both part of the same predetermined group), Sauk describes *reproducing enunciated data* in a binaural audio environment to signify a higher relevance. Otherwise, when the criteria and metadata indicate that less relevant audio is to be presented (e.g., when these users' devices are part of different groups), *reproducing enunciated data* from other user devices of a different predetermined group in 1-D monophonic format to signify a lower relevance. *Id.* In both scenarios, the data is *reproduced*, which is different from dynamically *altering processing* of the binaural sound in response to determining that the user is leaving the environment, as recited in limitation 7[e]. As such, Sauk cannot be said to teach alerting a user by "altering processing of the binaural sound," which corresponds to previously generated binaural audio that externally localized to empty space and to a virtual image in an environment. In

contrast, Sauk merely creates a static reproduction of the enunciated data without any altering of the previously produced audio.

ii. Sauk does not teach degrading audio cues

As mentioned above, limitation 7[e] recites, *inter alia*, “altering processing of the binaural sound to *degrade audio cues in order to prevent the user from experiencing external localization of the binaural sound.*” Sauk does not disclose and never mentions “*degrad[ing] audio cues*” in its disclosure. In contrast to degrading audio cues of the previously generated binaural audio, Sauk generates new binaural sound alerts to highlight relevant data. Begault, ¶35. For example, when detecting a hazard, Sauk receives enunciated data that includes audio data (e.g., message phrase) and metadata (e.g., GPS coordinates) to generate an audible warning with 3-D binaural sound so the user would ascertain the direction of the hazard. Sauk, 12:33-51.

Moreover, Sauk is incapable of degrading audio cues of previously generated binaural sound because it only reproduces or generates binaural, stereo, or mono sound anew and never mentions *degrading audio cues*, as required by limitations 7[c] and 7[e]. Begault, ¶36. Indeed, although the Petitioner attempts to portray Sauk as teaching degrading “binaural [audio] to monophonic or stereophonic audio [to] signif[y] a different level of relevancy,” Petitioner is mischaracterizing Sauk by

ignoring the respective context of Sauk. Pet. 25. That is, the relevant portion of Sauk cited by the Petitioner is related to a user selecting a filtering technique that allows the user to “chang[e] an audio format for sounds from binaural to monophonic or stereophonic.” Sauk, 11:26-55. Sauk does not dynamically change the spatial positioning of a generated sound between different states in response to a user’s position in an environment. Begault, ¶33. Instead, Sauk allows a user to select a means for spatial reproductions between separate audio environments (e.g., binaural or stereo) to denote relevancy to the user, and based on the user’s selection, Sauk *generates* the desired audio in a binaural or stereo format based on the metadata. Sauk, 11:26-55; Begault, ¶34. Indeed, since the binaural properties of the audio data in Sauk is predefined, Sauk cannot *degrade* audio cues in previously generated binaural sound, much less *degrade* audio cues in previously generated binaural sound in response to a user’s position in an environment.

iii. Clement and Sauk fail to teach degrading audio cues to alert a user that the user is leaving an environment.

Petitioner acknowledges that Clement and Sauk do not teach degrading audio cues to alert a user that the user is leaving an environment. To fill this gap, Petitioner argued that POSITA would have “known that *other types of alerts*”, meaning types of alerts other than fading out the sound, “would be more effective in some situations

to address the relevancy or immediacy of the transition.” Pet. 25. Petitioner then asserted that Sauk teaches one way to inform the user of the immediacy or relevance of the transition is to provide “an additional audible indication, such as degrading the ‘binaural [audio] to monophonic or stereophonic audio [to] signif[y] a different level of relevancy.” *Id.* However, as discussed above, Sauk never mentions altering, much less *degrading*, previously generated binaural audio in response to a user’s position in an environment. Begault, ¶33. In contrast, the alerts in Sauk teach adding in new externalized binaural alerts to indicate locations of hazards. Sauk, 12:33-51; Begault, ¶39. Indeed, hazard alerts in Sauk are only heard binaurally. Begault, ¶36.

iv. Clement and Sauk teaches away from degrading audio cues.

In addition to the above, the combination of Clement and Sauk teaches away from the recitations of limitation 7[e]. Petitioner specifically referenced Clement’s “fade out” from the virtual world when approaching obstacles (e.g., walls) and the alleged “degrading the ‘binaural [audio] to monophonic or stereophonic audio [to] signif[y] a different level of relevancy” described in Sauk 11:25-41 to teach these recitations. Pet. 25. However, in contrast to the Petitioner’s characterization that Sauk teaches alerting of immediacy or relevancy of the transition by degrading binaural audio to monophonic or stereophonic audio, Sauk teaches the opposite.

Sauk describes military tactical communication techniques in real-world situations involving GPS tracking pertinent to augmenting real-world visual and audio stimuli with messages and signals overlaid on the real world. Sauk, 10:44-58, 12:33-51. However, neither Sauk nor Clement contemplates a game or gameplay in a virtual environment, such that a POSITA would understand how Sauk's tactical system would provide different options for different conditions in immersive virtual environments. Begault, ¶37. Instead, Sauk provides a spatial prioritization scheme in which a user deterministically changes a means for spatial reproduction of sound based on relevance as decided by a user – not based on a location of a user. Begault, ¶38.

Keeping this in mind, the alerts described in Sauk teach *adding binaural audio alerts* to *increase* spatial awareness when the user is approaching a hazard. Sauk, 12:33-51; Begault, ¶38. Sauk teaches that these hazards would be considered highly relevant, and thus binaural audio alerts are generated because they provide spatial awareness. “The audible warning would thus alert the user that he is too close to the lethal toxin, and by listening to the 3-D binaural audio, the user would be able to ascertain a direction of the sensor 401 (and/or the associated hazard). Consequently, the user would know which direction to move away from in order to escape the affected area.” Sauk, 12:46-52.

Further, Clement teaches that a transition process from a virtual reality state to a real-world state may be initiated based on a position of a user, by *generating* an indicator, such as a buzz or vibration, by the HMD. Clement, 6:40-57. Clement also describes fading out virtual audio sound and fading in ambient sound in a serial fashion when transitioning between from the virtual world to the real world based on the position of the user. Clement, 9:20-31.

Accordingly, considering the teaching of Clement in view of Sauk, Clement would be modified to *generate* a binaural sound alert as described in Sauk to provide directional context to the user and alert the user that the user is approaching a hazard in the real world. That is, based on Clement's description with regard to creating an audible indication before the user reaches the boundary of the virtual world, Sauk would characterize the user's approach to the boundary in Clement as highly relevant and produce binaural sounds to provide the user sound localization features related to the boundary or the real world. Indeed, as discussed above, the fade out of virtual audio content in Clement is accompanied by fade in of ambient sounds. As such, Clement modified in view of Sauk would, at best, fade in ambient sounds *with sound localization cues* to enhance a user's ability to detect a location of the boundary or real world. In other words, Clement and Sauk would not be combined to *degrade audio cues*, as recited in limitation 7[e], to provide a user a transition between the

virtual world and the real world because the binaural sounds provided by Sauk *enhance* sound localization cues for the hazard.

Moreover, degrading the audio cues would frustrate the purpose of Sauk because Sauk focuses on providing directional context to indicate or alert to a user the location of the hazard, while degrading the audio cues would reduce the spatial context of the binaural sound. That is, if a POSITA were to look at the alert options available in Sauk, the POSITA would find that rather than altering binaural sound down to stereo or mono, Sauk teaches the opposite and adds in new externalized binaural alerts. Begault, ¶39.

The Petitioner referred to Dr. Begault's statement that allegedly conceded that switching from binaural to stereo or mono sound serving as an alert was known. Pet. 25-26. However, Sauk never describes switching between binaural audio and stereo/mono as a form of an alert. Begault, ¶39. Instead, Sauk's system provides a means of user interaction with the system (e.g., user selects mode) to change audio spatialization states, which is unrelated to changing audio spatialization states to alert a user of a user's relative position with respect to an environment. Begault, ¶40.

In view of the above, Petitioner fails to show a reasonable likelihood of success that Clement, Osman, and Sauk teaches or suggest limitation 7[e] in the '179 Patent. Indeed, none of the cited references mentions *alerting the user that the user*

is leaving the environment by altering processing of binaural sound by degrading audio cues to prevent sound localization. Further, the combination of Clement and Sauk teaches away from *alerting the user* that the user is leaving the environment by degrading binaural audio.

For the foregoing reasons, Petitioner failed to carry its burden as to this limitation.

8. Claims 8-13

As discussed above, Petitioner fails to carry its burden with respect to independent claim 7. Therefore, based at least upon the virtue of their dependency from claim 7, the Petitioner fails to carry its burden with respect to dependent claims 8-13.

9. Independent Claim 1

As discussed above with respect to limitation 7[d], Clement, Osman, and Sauk fail to teach “sensing, with one or more sensors in the HMD, when the user leaves the 3D virtual environment that includes the virtual image,” as recited in limitation 1[d]. First, Clement fails to detail that the HMD would detect its proximity to a boundary of the tracking area 320 *with the HMD*; and instead only provides for the tracking device 310 for tracking a user’s position within the tracking area 320. Clement, 4:49-5:16, 6:44-51. Since the visible wall defines the border of the real-world space 300, the user can only leave the environment defined by the tracking

area 320 via the invisible border. As such, Clement determines when the user leaves the tracking area 320 using the tracking device 310 and not *with sensors in the HMD*, as recited in limitation 1[d].

Additionally, Clement, Osman, and Sauk fail to teach “warning the user that the user is leaving the 3D virtual environment by *filtering*, by the DSP, the binaural sound to *alter audio cues to prevent the user from experiencing external localization of the binaural sound*,” as recited in limitation 1[e]. As mentioned above with respect to limitation 7[e], Clement merely mentions fading out audio content associated with the virtual world without regard to preventing the user from experiencing external localization of binaural sound, as recited in limitation 1[e]. That is, the fading out of the virtual world audio content in Clement does not include altering audio cues to prevent the user from experiencing external localization of the virtual sound. Begault, ¶41. Further, neither Osman nor Sauk cures the above deficiency. Indeed, Sauk *generates 3D sound in a binaural audio environment* to increase spatial awareness and signify a higher relevance of the alert. Sauk, 12:33-51; Begault, ¶39. Osman fails to cure this deficiency.

Additionally, as discussed above, combining Clement and Sauk teaches away from alerting the user that the user is leaving the environment by altering binaural sound to prevent external localization of the binaural sound. That is, Clement teaches *fading out* virtual audio content when approaching real-world obstacles (e.g., walls),

while Sauk teaches adding binaural sound alerts to improve audio cues to allow the user to experience external localization to become aware of the real-world hazards. Sauk, 12:33-51. Accordingly, modifying Clement in view of Sauk would result in a system that generates a binaural sound alert that provides directional context to the user to alert the user that the user is leaving the virtual world in Clement.

For the foregoing reasons, Petitioner failed to carry its burden as to this limitation.

10. Claims 2-6

As discussed above, Petitioner fails to carry its burden with respect to independent claim 1. Therefore, based at least upon the virtue of their dependency from claim 1, the Petitioner fails to carry its burden with respect to dependent claims 2-6.

11. Claims 2, 5, 11-13, and 20 are Unopposed

With respect to Ground 1, Petitioner failed to provide any reasoning as to the patentability of the recitations of claims 2, 5, 11-13, and 20 with respect to the cited references. As such, Petitioner failed to carry its burden as to these claims.

C. Ground 2. Lyren is Invalid Prior Art cannot be used to render obvious any claim of the '179 Patent.

Petitioner has failed to show a reasonable likelihood of success that Lyren and Reif, alone or in hypothetical combination, teach or render obvious each and every limitation of the '179 Patent. In particular, Petitioner's Ground 2 position focuses on

the ‘140 Application (Ex. 1028) lacking any teaching of alerting the user that the user is leaving the environment and thus breaking the chain of priority to Lyren. Pet. 35. However, as will be discussed in detail below, the ‘140 Application provides multiple examples and disclosures in which a POSITA would recognize a description of the claimed subject matter related to modifying binaural sound properties to provide an alert that the user is leaving an environment, including a 3D environment. Begault, ¶42. As a result, the ‘179 Patent maintains its priority chain to Lyren via the ‘140 Application, thereby making Lyren an invalid prior art reference.

1. Overview of ‘140 Application and Technology

a. Background

Each claim of the ‘179 Patent is entitled to the benefit of an earlier-filed application only if the earlier application satisfies the written description requirement of 35 U.S.C. §112. To satisfy the written description requirement, the objective standard is, “does the description clearly allow persons of ordinary skill in the art to recognize that he or she invented what is claimed.” *In re Gosteli*, 872 F.2d 1008, 1012 (Fed. Cir. 1989); M.P.E.P. §2163.02. When reviewing for the written description requirement, the claims and the entire specification, including the specific embodiments, figures, and sequence listings, should be reviewed to understand how applicant provides support for the various features of the claimed

invention. (M.P.E.P. §2163.II.A.2.) The subject matter of the claim need not be described literally (i.e., using the same terms or *in haec verba*) for the disclosure to satisfy the description requirement. *See* M.P.E.P. §2163.02. In other words, the written description requirement does not require the claims to recite the same terminology used in the disclosure.

While there is no *in haec verba* requirement, newly added claims or claim limitations must be supported in the specification through express, implicit, or *inherent disclosure*. M.P.E.P. 2163.I.B. Indeed, “[u]nder the doctrine of inherent disclosure, when a specification describes an invention that has certain undisclosed yet inherent properties, that specification serves as adequate written description to support a subsequent patent application that explicitly recites the invention’s inherent properties.” *Yeda Research and Dev. Co. v. Abbott GMBH & Co.*, 837 F.3d 1341(Fed. Cir. 2016). With this in mind, so long as the claimed invention is inherently disclosed in the specification, the application provides support for newly added claims.

Applying this legal standard, Petitioner’s argument that the priority chain is broken at the ‘179 Patent’s immediate parent, Application No. 16/106,140 (“140 application”), and thus the ‘179 Patent claims are not entitled to the benefit of any date earlier than the filing date of the ‘179 Patent, fails. As demonstrated below, the ‘140 Application, which includes the identical specification as Lyren, meets the

written description requirement for the alleged claim recitations corresponding to the broken priority chain, the priority chain of the ‘179 application is maintained to Lyren and thus Lyren cannot be used as a valid prior art reference.

b. Overview of Specification of ‘179 Patent, ‘140 Application, and Lyren

The specification sections of the ‘179 Patent, the ‘140 Application, and Lyren are identical. As such, although the references to various portions of the identical specifications will be discussed with reference to the ‘140 Application, it should be understood that the ‘140 Application and Lyren include the same disclosure.

As discussed above, the ‘140 Application is generally directed to providing binaural sound that localizes to a sound localization point (SLP) in empty space away from a person, such that the binaural sound changes (e.g., to *altered* binaural sound) when an event occurs. ‘140 Application, Ex. 1028, Abstract; Begault, ¶42. The ‘140 Application provides numerous examples of events that may trigger an action that alters the provided binaural sound. ‘140 Application, 25-29, 16:10-17:4; Begault, ¶42.

Among the events described in the ‘140 Application as triggering the change in binaural sound include, among other things,

- “a change in the ability to detect ... position in a physical or a virtual environment, or a change in the ability to detect an environment.” ‘140 Application, 49:31-50:10.
- “cues detected in a user’s ... physical or virtual environment such as cues indicating a location, position, or orientation, or *a changing in them*, cues indicating ... a changing in a physical or virtual environment.” *Id.*, emphasis added.
- “a location (such as a location ... of a person listening to the sound), ... position or movement ... of a person ..., distance from the person to an object ..., available space..., safety..., proximity to or being at a restricted area,” and the like. ‘140 Application, 16:15-17:4.
- “a degradation in the visibility of a user’s physical or virtual *environment*.” ‘140 Application, 50:15-20, emphasis added.

The ‘140 specification provides a method for determining whether to maintain binaural sound at the SLP or perform an action, such as altering binaural sound, based on movement of a person into a *restricted area*. ‘140 Application, FIG. 6, 28:21-32. In other words, FIG. 6 describes a method for altering binaural sound when a person moves from a non-restricted area into a restricted area.

As described with respect to FIG. 6, the ‘140 Application determines a location of a person while the person moves, maintains binaural sound at the SLP

when the person stays in a first environment (e.g., does not move into the restricted area), and takes an action (e.g., alters binaural sound) when the person moves into a second environment (e.g., the restricted area.) Examples of the restricted area are described in the ‘140 application as including, but not limited to, “an area, location, or a point that prohibits SLPs” and “an area in which it is dangerous to localize sound.” ‘140 Application, 29:1-3. In one example, the ‘140 Application describes providing binaural sound in a first environment for a user until the user is detected entering a car, and thus moving into a second environment. ‘140 Application, 29:13-18. After moving into the second environment (e.g., restricted area) from the first environment, the binaural sound provided to the user is altered. *Id.* As such, the user would *inherently* be alerted of the move from the first environment (e.g., outside of car) into the second environment (e.g., into the car) by the alteration of the binaural sound.

The ‘140 Application further clarifies that an action with regard to the binaural sound can occur based on a predictor 2042 that predicts events including “a location of a user.” ‘140 Application, 70:29-71:4. Indeed, the predictor is also described as being able to predict whether an object and an area or point of the SLP will ... be unwanted or undesired by the person.” ‘140 Application, 27:9-11. As such, the event may be triggered by the predictor predicting a location of a user with respect to the example events described above (e.g., change in physical or virtual

environment, position in physical or virtual environment, degradation in visibility of user's physical or virtual environment).

Further, the '140 Application illustrates that a sound localization system performs the methods described in the specification (e.g., FIGS. 2-16). '140 Application, 60:7-8. In addition, the '140 Application specifies that wearable electronic device 2008 includes sensors 2080, a location tracker 2082, and a sound localization system 2092. '140 Application, FIG. 20. As such, the WED may perform any of the methods described in the specification (e.g., FIGS. 2-16).

2. The '179 Patent Claims are supported by the '140 Application

Petitioner asserts that the '140 Application lacks any disclosure of (1) an HMD/WED sensing or determining when the user is leaving the 3D environment, and (2) alerting or warning that the user of that fact by reducing the sound's volume and/or otherwise altering it. Pet. 37. The '140 Application, however, provides sufficient disclosure of these features to demonstrate that the inventors had possession of the invention at the time of the disclosure.

a. HMD/WED Sensing when User is Leaving the 3D Environment

As a preliminary matter, Petitioner erroneously asserted that "[a]ll of the '179 Patent's claims directly (or indirectly via their independent claims) recite the HMD/WED sensing or determining when the user is leaving the 3D environment,

and alerting or warning that user of that fact by reducing the sound's volume and/or otherwise altering it.” *Id.* Indeed, only claims 1-6 of the ‘179 Patent claim *a 3D environment*. Instead, claims 7-20 explicitly recite “leaving an environment”- not a *3D environment*. Accordingly, Petitioner has failed to meet his burden with regard to establishing that the ‘140 Application fails to disclose these features and breaks the priority chain to Lyren. Lyren is therefore invalid prior art with respect to claims 7-20. Nevertheless, the ‘140 Application discloses the recitations at issue with regard to claims 1-6 as will be explained below.

i. HMD/WED Sensing or Determining

With regard to (1) *an HMD/WED* sensing or determining when the user is leaving the 3D environment, the ‘140 Application specifies that the WED 2008 includes sensors 2080, a location tracker 2082, and a sound localization system 2092, which can perform the methods (e.g., FIGS. 2-16) described in the specification. ‘140 Application, 60:7-8, 67:32-71:18. Since the WED includes a location tracker and FIG. 6 illustrates an action being triggered when the user leaves the first environment (e.g., non-restricted area) and enters the second environment (e.g., restricted area), the ‘140 Application discloses the WED sensing or determining leaving an environment.

The Petitioner asserts that the example, in which the user moves to a dangerous location, does not describe the user wearing an HMD or WED displaying a virtual environment, and that the as-filed claims of the ‘140 Application do not provide support for the same because they recite devices other than the WED or HMD as detecting various events. Pet. 38. Although the examples recited in the ‘140 Application may not explicitly indicate that the user is wearing the WED, a POSITA would clearly understand that the embodiments described herein may be implemented with the WED or HMD. Indeed, the ‘140 Application explains that “electronic devices include, but are not limited to, ... wearable electronic glasses, watches, *wearable electronic devices*, ... and other portable and non-portable electronic devices and systems.” ‘140 Application, 68:5-16, emphasis added. Further, the ‘140 Application specifies that “[b]locks and/or methods discussed herein can be executed and/or made by ... an electronic device.” ‘140 Application, 76:9-14. Accordingly, since the *entire specification*, including the specific embodiments, figures, and sequence listings, should be reviewed to understand how applicant provides support for the various features of the claimed invention, a POSITA would clearly understand that the ‘140 Application provided for the HMD or the WMD to perform the methods described therein. M.P.E.P. §2163.II.A.2.

ii. Sensing when User is Leaving the 3D Environment

Furthermore, with regard to sensing or determining when the user is *leaving the 3D environment*, the ‘140 Application provides specific references to the virtual environment in addition to the events related to the change in environments between non-restricted and restricted areas. For example, the ‘140 Application explicitly describes possible events as also including “a change in the ability to detect ... *position in a physical or a virtual environment*, or a change in the *ability to detect an environment*,” “cues detected in a user’s ... physical or virtual environment such as cues indicating a location, position, or orientation, or *a changing in them*, cues indicating ... *a changing in a physical or virtual environment*,” and “a degradation in the *visibility of a user’s physical or virtual environment*.” ‘140 Application, 49:31-50:10, 50:15-20, emphasis added. As such, the ‘140 Application *explicitly* describes events as including changes to physical and virtual environments and performing actions, such as adjusting binaural sound, in response to a detected event.

Moreover, the Petitioner and Roginska focus on the examples provided in the ‘140 Application and never evaluate the specification, *as a whole*. As mentioned above, the entire specification should be evaluated to understand how applicant provides support for the various features of the claimed invention. M.P.E.P. §2163.II.A.2. Additionally, claim limitations may be supported in the specification through express, *implicit*, or *inherent disclosure*. M.P.E.P. §2163.I.B. As such, assuming, *in arguendo*, that the ‘140 Application does not explicitly provide an

example in the WED determines that the user is leaving the 3D environment, a POSITA would clearly understand that the Patentee had possession of the claimed invention because the detectable events that can cause actions (e.g., adjust binaural sounds) as detailed in the '140 Application include changing between physical and virtual environments. Changing between physical and virtual environments requires a determination that the user is leaving the virtual environment. Since the WED is a type of electronic device described as performing the actions triggered by the detected events of the '140 Application, a POSITA would clearly understand that the '140 Application discloses the WED determining that the user is leaving the 3D environment (e.g., virtual environment).

b. Alerting the User that the User is Leaving the Environment

i. Alerting or Warning

With regard to *alerting or warning* the user that the user is leaving the environment (e.g., real or virtual), the Petitioner again focuses on the examples that are explicitly described in the '140 Application and conveniently ignores the rest of the specification. *Id.*, Roginska, ¶¶225-229. Indeed, as mentioned above, there is no *in haec verba* requirement, and claim limitations can be supported in the specification through *implicit or inherent disclosure*. M.P.E.P. 2163.I.B. With this in mind, the '140 Application describes events being triggered based on the user

leaving a first environment (e.g., non-restricted area) into a second environment (e.g., restricted). ‘140 Application, FIG. 6. Further, the ‘140 Application indicates that actions, such as altering binaural sound, may be taken in response to detecting an event. ‘140 Application, FIG. 16; Begault, ¶42. As such, the user would implicitly be alerted that the user has left the first environment and entered the second environment due to the sound format change.

Indeed, when characterizing Clement with respect to Ground 1, Petitioner argues that Clement implicitly discloses warning a user that the user is leaving the virtual world by fading out virtual audio. Pet. 14 and 23. That is, Petitioner asserted that Clement discloses “warning the user that the user is leaving the virtual world, by, e.g., ‘fad[ing] out [the] virtual audio” and that Clement “alerts or warns the user by initiating a ‘transition’ that may, for example, ‘fade out’ the virtual audio.” *Id.* However, Clement never explicitly mentions that the fade out effect is employed as a warning to the user that the user is leaving the virtual environment. Clement, 9:20-31. Moreover, when discussing the combination of Lyren and Reif, Petitioner declared that Lyren teaches “audible alerts/warnings, such as lowering the volume of the sound and/or switching to stereo or mono.” Pet. 44. In this way, the ‘140 Application at least *implicitly* discloses warning or alerting the user that the user is leaving the 3D environment by altering binaural sound in the same way that the Petitioner asserted that Clement and Lyren discloses the same.

ii. Leaving the Environment

Further, with regard to alerting or warning the user that the user is *leaving the environment (e.g., real or virtual)*, Petitioner admits that the ‘140 Application describes altering sound provide to the user upon detecting various other “events,” but asserts that the described events do not include leaving the environment. Pet. 37. Indeed, Petitioner points out that the ‘140 Application does not give “an example of using the user location to determine that (and to warn or alert) the user that the user is leaving the virtual environment.” Roginska, ¶225. In this way, Petitioner focuses only on the explicit examples listed in application for support for the claims. However, an objective standard for determining compliance with the written description requirement is, “does the description clearly allow persons of ordinary skill in the art to recognize that he or she invented what is claimed.” *In re Gosteli*, 872 F.2d 1008, 1012 (Fed. Cir. 1989). Indeed, the entire specification should be used to understand how support is provided for the features of the claims, and the subject matter of the claims need not be described literally to satisfy the description requirement. M.P.E.P. §2163.II.A.2.

With this in mind, the ‘140 Application clearly discloses that various types of events could trigger the binaural sound modification action described in FIG. 16. That is, as discussed above, the ‘140 Application discloses that the events include “a change in the ability to detect ... *position in a physical or a virtual environment*,”

“cues indicating ... a *changing in a physical or virtual environment*,” and “a degradation in the *visibility of a user’s physical or virtual environment*.” ‘140 Application, 49:31-50:10, 50:15-20, emphasis added. Indeed, Petitioner recognized that other events are described in the ‘140 Application outside of the explicitly detailed examples. For instance, Petitioner referred to the disclosure of determining when a user is in a dangerous location and detecting characters entering or leaving the environment. Pet. 38. However, Petitioner conveniently *ignored* the portions of the ‘140 Application describing the virtual environment, as if the Petitioner did not realize that the words “virtual environment” were ever recited in the specification.

Instead of addressing these references to the “virtual environment,” Petitioner argues that the closest exemplary triggering event in the ‘140 Application was determining a location (such as a location of an electronic device or of a person) but asserts that the specification does not “*give an example* of using the user’s location to determine and warn the user that the user is leaving virtual environment.” *Id.*, emphasis added. Here, Petitioner attempts to establish that the ‘140 Application must provide an example of the claimed embodiment. However, as discussed above, *implicit or inherent* disclosure may provide support for the claims. With this in mind, it is clear that the ‘140 Application anticipates that the events being able to trigger actions such as altering binaural sound include “a change in the ability to detect ... *position in a physical or a virtual environment*,” “cues indicating ... a

changing in a physical or virtual environment,” and “a degradation in the visibility of a user’s physical or virtual environment.” ‘140 Application, 49:31-50:10, 50:15-20, emphasis added. Accordingly, the ‘140 Application maintains the priority chain to the ‘179 Patent, which includes the same specification as Lyren. Therefore, the ‘179 Patent maintains the priority chain to Lyren, and Lyren is not valid prior art with respect to the ‘179 Patent.

3. Reif

Since the ‘179 Patent maintains the priority chain to Lyren, Reif is not a valid prior art reference because it was filed after the effective priority date of the ‘179 Patent. Further, even if Reif were a valid prior art reference, Reif would not reasonably be combined with Lyren to warn or alert the user that the user is leaving the 3D environment by filtering or degrading sounds to prevent the user from experiencing external localization of sounds or by reducing a volume of sounds that externally localizes in an empty space, as recited in claims 1, 7, and 14. In contrast, Reif describes adding an audible warning beep or voice message when the user is detected to be outside a set of boundaries and has no reasoning or suggestion to reduce sound localization effects, much less reduce filter, degrade, or reduce binaural sounds to prevent the user from experiencing external sound localization. Reif, [0039]. Indeed, Petitioner fails to provide a rational reasoning with regard to

a POSITA's motivation to modify Reif in view of Lyren to obtain the claimed invention.

When evaluating the combination of references, it is important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). Specifically, there must be some articulated reasoning with a rational underpinning to support a conclusion of obviousness; a conclusory statement will not suffice. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). Further, it is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743 (Fed. Cir. 1983).

Keeping this in mind, Petitioner explains that Lyren teaches “audible alerts/warnings, such as lowering the volume of the sound and/or switching to stereo or mono, in response to the event of the user leaving the virtual environment,” as proposed by Reif. Pet. 44. Petitioner then asserts that in view of the combination of the “HMD” in Reif that detects the “event” in Lyren of the user leaving the safe region in Reif, it would have been obvious to lower the sound's volume as taught by Lyren. *Id.*. Indeed, Petitioner asserts that although Reif suggests a warning beep or message, a POSITA would be informed by Reif that many variations of alerts are possible including those provided in Lyren, such as altering binaural sound. *Id.* 43-

44. The Petitioner, however, has not provided a reason in which a POSITA would be prompted to combine Reif in a manner *to reduce volume of sounds*, as opposed to creating a warning beep or message. Indeed, Reif only mentions using notification module to generate notifications for display to inform a user of his/her current location by way of visual indications, audio indications (e.g., warning beep, voice message), and haptic indications. As such, Reif only describes *adding* indications to notify the user of his position. Indeed, Reif's mere mention that it should be appreciated that many variations of notifications are possible is merely a conclusory statement without any articulated reasoning with rational underpinning as to why a POSITA would be motivated to look to Lyren to reduce volume or alter binaural sound to notify the user that he is outside a boundary defined in Reif.

4. Independent Claim 14

a. '179 Patent Maintains Priority Chain to Lyren with regard to Determining When a User is Leaving an Environment

Limitation 14[d] recites, *inter alia*, “alerting the user that the user is leaving *the environment* by reducing a volume of the binaural sound that localizes from the virtual image and that is being provided to the user.” As discussed above, Lyren is an invalid prior art reference because the ‘140 Application maintains support for a WED determining when the user is leaving the environment in view of the disclosed events including “a change in the ability to detect ... *position in a physical or a*

virtual environment,” “cues indicating ... a *changing in a physical or virtual environment,*” and “a degradation in the *visibility of a user’s physical or virtual environment.*” ‘140 Application, 49:31-50:10, 50:15-20, emphasis added. Moreover, as mentioned above, limitation 14[d and e] recites determining when/that the user is leaving *the environment*, not the 3D environment. Indeed, Petitioner admitted that Lyren teaches detecting triggering events to alter sound include moving into restricted areas, such as locations near a construction zone or other dangerous or hazardous area. Roginska, ¶87. As such, the ‘140 Application, clearly discloses detecting when a user leaves a non-restricted area (e.g., first environment) and enters a restricted area (e.g., second environment). Since claims 14-20 never recite leaving a 3D environment, Petitioner has not met his burden with regard to proving that the ‘179 Patent has a broken chain of priority to Lyren and thus, Lyren is an invalid prior art reference.

b. Lyren and Reif teaches away from alerting the user that the user is leaving the environment by reducing a volume of the binaural sound (14[e]).

Assuming, *in arguendo*, that Lyren is a valid prior art reference, the combination of Lyren and Reif teaches away from alerting the user that the user is leaving the environment by reducing a volume of the binaural sound that localizes from the virtual image and that is being provided to the user. That is, although Reif describes gradually decreasing the *opacity of the virtual scene* displayed to the as

the user travels away from a boundary, Reif never describes using audio cues in the same manner. Reif, [0018], [0039]. In contrast, Reif mentions increasing audio cues to notify a user of his position with respect to a boundary. *Id.* As such, Reif teaches away from the combination with Lyren and never provides any articulated reasoning as to why a POSITA would be motivated to modify the audio notifications of Reif to reduce a volume of binaural sound that localizes from a virtual image. In fact, Reif never mentions binaural sound or using sound localization effects anywhere in its disclosure.

For the foregoing reasons, Petitioner failed to carry its burden as to this limitation.

5. Independent Claim 7

a. ‘179 Patent Maintains Priority Chain to Lyren with regard to Determining When a User is Leaving *an Environment*

Limitation 7[e] recites, *inter alia*, “alerting the user that the user is leaving *the environment* by altering processing of the binaural sound to degrade audio cues in order to prevent the user from experiencing external localization of binaural sound.” As discussed above, Lyren is an invalid prior art reference because the ‘140 Application maintains support for a WED determining when the user is leaving the environment in view of the ‘140 Applications descriptions of events that refer to physical and virtual environments. ‘140 Application, 49:31-50:10, 50:15-20,

emphasis added. Moreover, limitation 7[d and e] recites determining when/that the user is leaving *the environment*, not the 3D environment. Indeed, Petitioner admitted that Lyren teaches detecting triggering events to alter sound include moving into restricted areas, such as locations near a construction zone or other dangerous or hazardous area. Roginska, ¶87. As such, the ‘140 Application, clearly discloses detecting when a user leaves a non-restricted area (e.g., first environment) and enters a restricted area (e.g., second environment). Since claims 14-20 never recite leaving a 3D environment, Petitioner has not met his burden with regard to proving that the ‘179 Patent has a broken chain of priority to Lyren and Lyren is an invalid prior art reference.

b. Lyren and Reif teaches away from alerting the user that the user is leaving the environment by altering processing of binaural sound to degrade audio cues (7[e]).

As discussed above, the combination of Lyren and Reif teaches away from alerting the user that the user is leaving the environment by altering processing of binaural sound to degrade audio cues to prevent the user from experiencing external localization of the binaural sound. That is, although Reif describes gradually decreasing the *opacity of the virtual scene* displayed to the as the user travels away from a boundary, Reif never describes using audio cues in the same manner, much less to degrade audio cues to prevent a user from experiencing external localization

of binaural sound. Reif, [0018], [0039]. In contrast, Reif only mentions providing affirmative or increasing audio cues to notify a user of his position with respect to a boundary. *Id.* As such, Reif teaches away from the combination with Lyren and Reif never provides any reasoning to modify the audio notifications of Reif to alter processing of binaural sound to degrade audio cues to prevent a user from experiencing external localization of binaural sound. In fact, Reif never mentions binaural sound or using sound localization effects anywhere in its disclosure.

For the foregoing reasons, Petitioner failed to carry its burden as to this limitation.

6. Independent Claim 1

a. ‘179 Patent Maintains Priority Chain to Lyren with regard to Determining When a User is Leaving a 3D Virtual Environment

As discussed above, Lyren is an invalid prior art reference because the ‘140 Application maintains support for a WED determining when the user is leaving the environment in view of the ‘140 Applications descriptions of events that include “a change in the ability to detect ... *position in a physical or a virtual environment,*” “cues indicating ... *a changing in a physical or virtual environment,*” and “a degradation in the *visibility of a user’s physical or virtual environment.*” ‘140 Application, 49:31-50:10, 50:15-20, emphasis added. As such, Petitioner has not

met his burden with regard to proving that the '179 Patent has a broken chain of priority to Lyren and, thus Lyren is an invalid prior art reference.

b. Lyren and Reif teaches away from filtering binaural sound to alter audio cues (1[e]).

As discussed above, the combination of Lyren and Reif teaches away from warning the user that the user is leaving the 3D virtual environment by filtering binaural sound to alter audio cues in order to prevent the user from experiencing external localization of the sounds. Indeed, although Reif describes gradually decreasing the *opacity of the virtual scene* displayed to the as the user travels away from a boundary, Reif never describes using audio cues in the same manner, much less to filtering binaural sound to alter audio cues to prevent a user from experiencing external localization of binaural sound. Reif, [0018], [0039]. In contrast, Reif only mentions providing affirmative or increasing audio cues to notify a user of his position with respect to a boundary. *Id.* As such, Reif teaches away from the combination with Lyren. Indeed, Reif never provides any reasoning to modify the audio notifications of Reif to filter binaural sound to alter audio cues to prevent a user from experiencing external localization of binaural sound. In fact, Reif never mentions binaural sound or using sound localization effects anywhere in its disclosure.

For the foregoing reasons, Petitioner failed to carry its burden as to this limitation.

7. Dependent Claims 2-6, 8-13, and 15-20

With regard to claims 2-6, 8-13, and 15-20, Petitioner admitted that “Lyren teaches nearly each and every claim element of the ’179 Patent,” but “fails to teach or suggest the that its HMD/WED senses or determines when the user is leaving the 3D environment, and fails to teach or suggest alerting or warning that user that the user is leaving the environment by altering the binaural sound.” Roginska, ¶231. However, as discussed in detail above, the ’140 Application provides multiple examples and disclosures in which a POSITA would recognize a description of the claimed subject matter related to modifying binaural sound properties to provide an alert that the user is leaving a 3D environment. Further, with regard to claims 8-13 and 15-20, independent claims 7 and 14 never require leaving a 3D environment. As a result, the ’179 Patent maintains its priority chain to Lyren via the ’140 Application, thereby making Lyren an invalid prior art reference. Since Petitioner relies on Lyren to teach claims 2-6, 8-13, and 15-20, and since Lyren is invalid prior art, the Petitioner has failed to carry its burden with regard to claims 2-6, 8-13, and 15-20.

D. 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 to deny institution here.

1. 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*¹ and *Fintiv*² 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 December 2024, at least four months after the jury trial begins in August, 2024. The ’179 Patent is involved in the related matter (Pet. 65) that involves the same issues, arguments, and evidence that Petitioner has presented in the Petition. Petitioner chose to give little attention to the discretionary issues in the Petition and provides no *Sotera* stipulation resulting in an overlap of invalidity issues. Pet. 64-65. Duplicating the district court’s efforts would not be an efficient use of the Board’s resources and

¹ *NHK Spring Co., Ltd., v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 (PTAB Sep. 12, 2018) (precedential).

² *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (“*Fintiv*”) (precedential).

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.

a. 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. While there is a pending motion for inter-district transfer, Petitioner has not sought a stay pending resolution of the motion, and overall a stay is unlikely. Pet. 64-65.

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.”); and *see also, Fintiv*, Paper 15 at 12 (remarking judges decide stays based on the facts at issue in each case, and the Board refuses to infer how district courts will act in different cases with different facts).

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.

b. 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. 2002 at 5. This trial date is currently at least four (4) months before an expected December 2024 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).

There is no reason to believe the August 2024 trial will be postponed, much less postponed significantly enough to close the four-month gap such that the FWD would issue before the trial. *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).³ 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.

c. 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; this Petition was filed on June 8, 2023. Pet. 65, 68. 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

³ 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. 2003).

The *Fintiv* Memo directs the Board to “consider the median time from filing to disposition” in the district court (Ex. 2003 at 3), which for patent cases in the Western District of Texas is 25.4 months (Ex. 2004), and for patent cases before Judge Albright is 24.7 months (Ex. 2005). Counting from the June 3, 2022 filing of the parallel district court case results in an average time to trial before the end of July 2024, well in line with the scheduled August 2024 trial and roughly five months before any expected FWD here.

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 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 over 11 months to file this Petition. By the time an institution decision is rendered in December 2023, the parties will have (1) completed Claim Construction briefing after depositions, (2) have had the Court rule on Petitioner’s motion to transfer after related discovery and depositions, (3) conducted a Markman hearing, (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), (5) exchanged Final Infringement and Invalidity Contentions, and (7) closed fact discovery, which opens July 6, 2023 and closes December 21, 2023. Ex. 2002. Petitioner’s decision to challenge venue has significantly increased the investment of the parties in the district court action. 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 Patent Owner by the time an institution decision is rendered. This factor weighs in favor of discretionary denial of institution.

d. 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 Patent Owner 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 ’179 Patent are allegedly obvious over at least the prior art Clement, Osman, and Sauk. Ex. 2001 at 167-69. Thus, the claims and prior art addressed by PTAB will not materially differ from what is being addressed in the parallel district court litigation. Further, as discussed above, there are blatant contradictions between the present Petition and Defendants’ Invalidity Contentions in district court. Conducting proceedings in both the PTAB and district

court with differing claim constructions and 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 be an efficient use of 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 (emphasis added). 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.

IV. CONCLUSION

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

Date: September 14, 2023

Respectfully submitted,

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Case No. IPR2023-01019

Patent No. 10,368,179 B1

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 13,494 words using the word count feature of Microsoft Word.

Dated: September 14, 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 8, 2023 at the following email correspondence addresses of record:

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