



Transcript of Dr. Agnieszka Roginska

Date: February 27, 2024

Case: Meta Platforms, Inc. -v- Eight kHz, LLC (PTAB)

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WORLDWIDE COURT REPORTING & LITIGATION TECHNOLOGY

Transcript of Dr. Agnieszka Roginska
Conducted on February 27, 2024

1 (1 to 4)

1 UNITED STATES PATENT AND TRADEMARK OFFICE 2 ----- 3 BEFORE THE PATENT TRIAL AND APPEAL BOARD 4 ----- 5 META PLATFORMS, INC., 6 Petitioner, 7 v. 8 EIGHT KHZ, LLC, 9 Patent Owner. 10 ----- 11 Case IPR 2023-01019 12 Patent 10,368,179 13 14 Case IPR 2023-01020 15 Patent 10,448,184 16 17 Case IPR 2023-01024 18 Patent 11,290,836 19 ----- 20 Videotaped Deposition of DR. AGNIESZKA ROGINSKA 21 Conducted virtually via Zoom 22 Tuesday, February 27, 2024 at 9:30 a.m. CST	1 A P P E A R A N C E S 2 ON BEHALF OF THE PETITIONER: 3 CHRISTOPHER W. HENRY, ESQUIRE 4 LATHAM & WATKINS LLP 5 200 Clarendon Street 6 Boston, Massachusetts 02116 7 617-880-4550 8 christopher.henry@lw.com 9 10 ON BEHALF OF THE PATENT OWNER: 11 JAYME PARTRIDGE, ESQUIRE 12 SPENCER FANE LLP 13 3040 Post Oak Boulevard, Suite 1400 14 Houston, Texas 77056 15 713-212-2713 16 jpartridge@spencerfane.com 17 and 18 19 20 21 22
1 Job No.: 526237 2 Pages: 1 - 296 3 Reported by: THERESA A. VORKAPIC, 4 CSR, RMR, CRR, RPR 5 6 Videotaped deposition of Dr. Agnieszka 7 Roginska, conducted virtually via Zoom, pursuant 8 to notice before Theresa A. Vorkapic, a Certified 9 Shorthand Reporter, Registered Merit Reporter, 10 Certified Realtime Reporter, Registered 11 Professional Reporter and a Notary Public in and 12 for the State of Illinois. 13 14 15 16 17 18 19 20 21 22	1 A P P E A R A N C E S (Continued) 2 ON BEHALF OF THE PATENT OWNER: 3 JAYNE C. PIANA, ESQUIRE 4 FLETCHER YODER 5 11450 Compaq Center Drive West 6 Building 9, Suite 300 7 Houston, Texas 77070 8 281-970-4545 9 piana@fyiplaw.com 10 11 ALSO PRESENT: 12 Brennan Plummer, Audiovisual Technician, 13 Planet Depos 14 Robert Leonard, Videographer, Planet Depos 15 16 17 18 19 20 21 22

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Eight khz, LLC
Exhibit 2014
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2 (5 to 8)

5	7
1 C O N T E N T S	1 THE VIDEOGRAPHER: The court reporter
2 EXAMINATION OF DR. AGNIESZKA ROGINSKA PAGE	2 today is Theresa Vorkapic. She also represents
3 Examination By Ms. Piana 7	3 Planet Depos. Will the court reporter please
4 Examination By Mr. Henry 284	4 swear in the witness.
5 Further Examination By Ms. Piana 288	5 THE REPORTER: Would you raise your right
6	6 hand, please.
7 E X H I B I T S	7 (The witness was duly sworn.)
8 (Attached to transcript.)	8 DR. AGNIESZKA ROGINSKA,
9	9 called as a witness herein, having been first duly
10 ROGINSKA DEPOSITION EXHIBITS PAGE	10 sworn, was examined and testified as follows:
11	11 EXAMINATION
12 Exhibit 1 Roginska '179, '184 17	12 BY MS. PIANA:
13 Declaration	13 Q Great. Thank you.
14 Exhibit 2 '179 Patent 116	14 Dr. Roginska, will you please state your
15 Exhibit 3 '140 Application 163	15 full name for the record this morning.
16 Exhibit 4 US Patent 9,690,374 176	16 A Agnieszka Roginska.
17 Exhibit 5 US Patent 7,876,903 252	17 Q Where are you sitting today?
18 Exhibit 6 US Patent 10,448,184 255	18 A I'm sitting in the office of Latham &
19 Exhibit 7 '836 Patent Declaration 283	19 Watkins in New York City.
20	20 Q I see that Mr. Henry is there with you; is
21	21 that correct?
22	22 A That's correct.
6	8
1 P R O C E E D I N G S	1 Q Is there anybody else with you in the
2 THE VIDEOGRAPHER: Here begins video file	2 room?
3 No. 1 in the video deposition of Agnieszka	3 A No.
4 Roginska Ph.D., in the matter of Meta Platforms,	4 Q You understand that when we're on the
5 Inc. versus Eight KHz, LLC, the United States	5 record you're not supposed to be chatting with
6 Patent and Trademark Office, before the Patent	6 counsel for Meta with Mr. Henry via any chat
7 Trial and Appeals Board, Case No. IPR-2023-01019	7 feature; is that right?
8 and 01020 and 01024.	8 A That's right.
9 Today's date is February 27, 2024 and the	9 Q What materials did you bring with you to
10 time on my video monitor is 9:30 a.m. Eastern	10 your deposition today?
11 Time. My name is Robert Leonard. I'm the video	11 A I have a clean copy of my both my
12 specialist. I represent Planet Depos. This	12 declarations and I have printed copies of all the
13 deposition is being taken via Zoom.	13 exhibits and I have electronic copies of my
14 Will counsel please identify themselves	14 declaration – declarations and the patents.
15 verbally and state who they represent.	15 Q You mentioned you have clean copies of
16 MR. HENRY: This is Chris Henry of Latham	16 your declarations, so I assume that means it no
17 & Watkins for petitioners and the witness.	17 handwritten notes?
18 MS. PIANA: This is Jayne Piana at Fletcher	18 A That's correct.
19 Yoder for Eight KHz.	19 Q Do you have any handwritten notes on any
20 I was going to note we also have Jayme	20 of the materials with you today?
21 Partridge who looks to be connecting to audio.	21 A No.
22 She is with Spencer Fane and represents Eight KHz.	22 Q Without revealing any attorney-client

9 1 privileged information, what did you do to prepare 2 for your deposition today? 3 A I reviewed my declarations as well as the 4 exhibits, and I met with the counsel for Meta. 5 Q Is that Mr. Henry? 6 A That's correct. 7 Q Did you meet with any other counsel for 8 Meta? 9 A I did. 10 Q Who was that? 11 A Inge Osman. 12 Q About how long did you meet with counsel? 13 A Do you mean to prepare for today? 14 Q Yes. Thank you. 15 A We met four times. Each time anywhere 16 between two hours and full day, I'm guessing 17 around eight hours. 18 Q So if you were to add up generally what 19 those time periods are, how many hours did you 20 spend meeting with counsel to prepare for your 21 deposition today? 22 A Let me do the math. Probably around 22,	11 1 will do our best. We want to make sure that you 2 are answering the questions and looking at the 3 exhibits -- answering the questions fully and 4 seeing the exhibits that we'll be discussing 5 today. 6 As we proceed throughout the day, I will 7 be asking you questions. Your counsel may object, 8 but you still have to proceed and answer my 9 questions unless your counsel instructs you not 10 to. 11 Do you understand that? 12 A I do. 13 Q Also, as we proceed throughout the day, 14 you know that you can ask for a break. 15 A Yes. 16 Q Great. I will ask you that -- happy to 17 take a break whenever you need one, but if there 18 is a pending question, let's finish -- let's get 19 your answer to the pending question before we take 20 a break. 21 Is that okay with you? 22 A Yes.
10 1 24 hours. 2 Q Generally when did those meetings occur? 3 A They occurred last week and yesterday. 4 Q Dr. Roginska, what is the hourly rate that 5 you are charging for your time in this case? 6 A 550 per hour. 7 Q About when did you start working on these 8 IPRs? 9 A It was around September of 2022. 10 Q Back to your hourly rate, is that your 11 standard hourly rate for this type of work? 12 A Yes, it is. 13 Q How many times have you been deposed 14 before? 15 A This is my first time. 16 Q So just to go over some of the rules of 17 the road, and your counsel may have covered this 18 with you in your preparation, but this is 19 obviously a remote deposition. Our tech, 20 Mr. Plummer, is going to help with the exhibits. 21 If you have any questions or any technical issues 22 regarding the exhibits, please let us know and we	12 1 Q Is there any reason you cannot provide 2 accurate and truthful testimony to my questions 3 today? 4 A No. 5 Q Dr. Roginska, do you know Dr. Durand 6 Begault? 7 A I do. 8 Q How do you know him? 9 A I met him early 2000s. I don't remember 10 exactly the date, and we with worked on a project 11 together when I was working for a company in 12 California. So we worked together for I guess it 13 must have been maybe a couple of years on one 14 specific project. Durand Begault was also on my 15 doctoral defense at Northwestern. 16 Q What is your general opinion of 17 Dr. Begault? 18 MR. HENRY: Objection. Form. 19 BY THE WITNESS: 20 A My general opinion is that Durand Begault 21 is person who has clearly been working in the area 22 of 3D sound for a long time and has published

13 1 several papers and as well as a book in the area 2 of spacial audio and is regarded as a notable 3 figure in the field. 4 Q So would you agree that he's an expert in 5 this field? 6 A I would agree, yes. 7 Q You've relied on some of his work in this 8 case; is that correct? 9 A That's correct. 10 Q Which work in particular have you relied 11 on from Dr. Begault in this case? 12 A In particular I've relied on the book, 13 titled 3D Sound that he wrote, first version was 14 in 1994 and the subsequent edition was in the year 15 2000. 16 Q Do you have any reason to doubt him as an 17 expert in this field? 18 MR. HENRY: Objection to form. 19 BY THE WITNESS: 20 A I guess it would depend on what we're 21 specifically talking about. 22 BY MS. PIANA:	15 1 project together and I was working on that project 2 with her then advisor so she was involved in some 3 of the work. 4 Q I'm sorry, did you say that you were 5 Dr. McMullen's advisor? 6 A No, no. I was working with Dr. McMullen's 7 advisor at University of Michigan and so I was 8 working with him, and since she was his advisee, 9 she was involved in that project. 10 Q Thank you for the clarification there. 11 Would you agree that Dr. McMullen is an 12 expert in this field? 13 A Yes. 14 Q Are you aware that Dr. McMullen was 15 deposed in the litigation that is proceeding in 16 parallel to these IPRs? 17 A I don't think so. I don't believe I 18 was – I knew that. 19 Q Do you have any reason to doubt 20 Dr. McMullen's status as an expert in this 21 field? 22 A No. She has been working in this field
14 1 Q Okay. We'll go through that today. 2 Have you reviewed Dr. Begault's 3 declarations in the '179, '184 IPRs or the '836 4 IPR? 5 A I've seen them. I would say I skimmed 6 through them. 7 Q Do you have any comments on either of 8 those declarations from declarations from 9 Dr. Begault? 10 MR. HENRY: Objection to form. Ambiguous. 11 BY THE WITNESS: 12 A As I said, I skimmed the document. If 13 there's a specific question that you have, I'm 14 happy to answer. 15 Q I think we'll get to that later today. 16 What about Dr. Kyla McMullen, do you know 17 her? 18 A I do. 19 Q How do you know Dr. McMullen? 20 A Let me think. So I met Dr. McMullen when 21 she was a PhD student at I think it was Michigan, 22 University of Michigan, and we were working on a	16 1 for now many years and she's a professor, so in my 2 opinion she should be considered an expert. 3 Q So I take it you have not reviewed 4 Dr. McMullen's deposition transcript from the 5 litigation? 6 A No. 7 Q How would you define a person of ordinary 8 skill in the art in these cases? 9 MR. HENRY: Objection to form. 10 BY THE WITNESS: 11 A So I covered this in my declaration. 12 BY MS. PIANA: 13 Q Why don't we go ahead and introduce your 14 declaration as Exhibit 1. 15 MS. PIANA: Mr. Plummer, if you could pull 16 up the document entitled: Roginska '179, '184 17 declaration. 18 AV TECH PLUMMER: Stand by. One moment. 19 Bear with me. This first one will be a little bit 20 slower, but it will be smoother going forward. 21 I've uploaded it to the file in the chat 22 and I'm showing it on the screen now.

17 1 BY MS. PIANA: 2 Q Dr. Roginska, can you see what's been 3 marked as Exhibit 1 on the screen? 4 A Yes, I can. 5 (A certain document was marked Roginska 6 Deposition Exhibit 1 for identification, 7 as of 02/27/2024.) 8 BY MS. PIANA: 9 Q Can you identify that document for us, 10 please? 11 A That document is my declaration for 12 patents '179 and '184. 13 Q It sounds like you are very familiar with 14 the way we routinely refer to patents by their 15 last three digits. 16 A That's correct. 17 Q So if when I talked about the '179 patent 18 or the '184 patent, you know exactly which patents 19 I'm discussing, right? 20 A That's correct. 21 Q I would ask you a question about your 22 definition of a person of ordinary skill and you	19 1 by that last sentence: "Additional education can 2 compensate for less experience and vice versa"? 3 A Sure. What I mean is that a person who 4 might have more education than the stated 5 education above, which is a bachelor's degree, so 6 a person with more education can compensate for 7 having less experience in the industry, which I 8 state here as being two years or vice versa, 9 meaning that if a person has more experience in 10 the industry, they might have less education than 11 I stated. 12 Q Do you think a POSA -- 13 Do you think a person who had zero years 14 of industry experience would meet your definition 15 of a POSA as stated here in Paragraph 34? 16 A They might. 17 Q Could you expand on that? 18 A Sure. 19 MR. HENRY: Objection to form. 20 BY THE WITNESS: 21 A A person who has advanced degrees and has 22 done significant work during their advanced
18 1 mentioned your declaration, which is why we've 2 introduced it now as Exhibit 1. 3 I'll repeat my question about how would 4 you define a person of ordinary skill in the art 5 in this field? If you would like to refer to a 6 particular paragraph in your declaration, feel 7 free to do so. 8 A Sure, thank you. 9 So, yes, I would like to refer in my 10 declaration to paragraph number 34. And in that 11 paragraph, I describe the level of skill in the 12 art: "A POSA at the time of the priority date for 13 the '179 and '184 patents either December 27, 2015 14 or their filing dates, May 2, 2019 and June 16, 15 2019, would have had a bachelor's degree in 16 computer science or engineering, music technology, 17 and at least two years of industry experience or 18 academic research experience in virtual or 19 augmented reality, audio engineering, or an 20 equivalent. Additional education can compensate 21 for less experience and vice versa". 22 Q Thank you. Can you explain what you mean	20 1 degrees, for example, Masters or a Ph.D. degree, 2 might have a significant level of experience, 3 sometimes even more experience than a person who 4 would be working in the industry. 5 BY MS. PIANA: 6 Q Is the experience that you were just 7 mentioning that a person would get in getting 8 their Masters or Ph.D., is that industry 9 experience? 10 A Well, if they are not employed in the 11 industry, it wouldn't be technically industry 12 experience, however, there are cases, for example, 13 when I work with Ph.D. students who have 14 internships in the industry and gain some 15 experience through that. 16 The people or students who are working on 17 advanced degrees very often work on projects that 18 might be similar to projects you would expect to 19 see in the industry. 20 Q Did -- this concept of additional 21 education compensate for less experience and vice 22 versa, did that come from you?

21 1 MR. HENRY: Objection to form. 2 BY THE WITNESS: 3 A Yes. 4 BY MS. PIANA: 5 Q It did not come from your counsel? 6 MR. HENRY: Objection to form. 7 BY THE WITNESS: 8 A No, it did not. 9 BY MS. PIANA: 10 Q So back to the way you defined a POSA here 11 in Paragraph 34, you would agree that Dr. Begault 12 has these credentials and would meet this 13 definition? 14 A No, I would -- I think Dr. Begault, given 15 his extensive experience, has more than the person 16 of ordinary skill in the art. 17 Q So in your opinion, Dr. Begault would have 18 a higher level of expertise than a person of 19 ordinary skill in the art? 20 A Yes. 21 Q What about yourself? 22 A The same. I would say I have more than --	23 1 BY THE WITNESS: 2 A As I said, I mentioned those dates 3 because -- it's it is at that time that I think 4 that the patents were filed. So when I was 5 thinking about the person of ordinary skill in the 6 art, I was going back to what that person would 7 have been at that time. 8 BY MS. PIANA: 9 Q But your definition of a person of skill 10 in the art doesn't change depending -- based on 11 the date, does it? 12 A It might. 13 Q How would it change? 14 A Well, it might change because in my field 15 especially technology advances very quickly and so 16 I wanted to specifically state that when I was 17 looking at these patents and reviewing the 18 documents for this case, I had in mind 19 specifically that what a person of skill in the 20 art at that time would have known and should have 21 known in relationship to these patents. 22 Q Are your opinions as stated in this
22 1 more skill than the person of ordinary skill in 2 the art. 3 Q This first part of Paragraph 34, you 4 mention a few dates. You say December 27, 2015 or 5 their filing dates, May 2nd, 2019 and June 16, 6 2019. 7 Why did you mention those dates in this 8 paragraph? 9 A Well, those dates -- so December 27, 2015 10 if I am looking at '179 patent December 27, 2015 11 is the earliest filing date that is listed on the 12 patent. And the date of May 2nd, 2019 is listed 13 as the date that the patent was filed and the date 14 June 16, 2019 is listed on the '184 patent as the 15 date that the patent was filed. 16 Q So why did you -- thank you for taking me 17 through those dates. 18 So why did you mention those in your 19 definition of a person of ordinary skill in the 20 art? 21 MR. HENRY: Objection to form, asked and 22 answered.	24 1 declaration here Exhibit 1, are they any different 2 depending on which date you are using for a person 3 of ordinary skill in the art? 4 MR. HENRY: Objection to form. 5 BY THE WITNESS: 6 A Well, I wrote these opinions and that I 7 stand by them and, as I said, when I was reviewing 8 these documents, I had in mind what a person of 9 skill in the art would have been like and should 10 have been like during -- at those dates. 11 BY MS. PIANA: 12 Q So do you have a different opinion about 13 what a person of ordinary skill in the art would 14 have known at the date of December 27, 2015 15 versus, for example, May 2nd, 2019? 16 MR. HENRY: Objection to form, ambiguous. 17 BY THE WITNESS: 18 A I'm not sure what you mean. 19 BY MS. PIANA: 20 Q Sure. In this declaration, you have 21 listed many opinions about the '179 and the '184 22 patents, correct?

25 1 A Correct. 2 Q Are those opinions based on what a POSA, a 3 person of ordinary skill in the art, would have 4 known as of December 27, 2015? 5 A As I said here, either December 27, 2015 6 or the filing dates of May 2nd, 2019 and June 16, 7 2019. 8 Q You just said, though, that a POSA may 9 know something different as of December 27, 2015 10 or May 2nd, 2019, correct? 11 MR. HENRY: Objection to form. 12 BY THE WITNESS: 13 A Well, you know, in my field there are 14 papers that come out all the time. There's 15 knowledge that is being added. So every year a 16 POSA would have more knowledge, more information 17 depending on the research that comes out. 18 BY MS. PIANA: 19 Q Okay. And so your opinions as listed in 20 your declaration here in Exhibit 1, are they based 21 on a POSA as of December 27, 2015 or a POSA as of 22 May 2nd, 2019 or a POSA as of June 16, 2019?	27 1 How would I know reading your declaration 2 which version of a POSA you are applying for your 3 opinions? 4 MR. HENRY: Objection to form, calls for 5 speculation. 6 BY THE WITNESS: 7 A The POSA that I describe, again, has a 8 bachelor's degree or the equivalent of a 9 bachelor's degree in computer science and at least 10 two years of industry experience. 11 BY MS. PIANA: 12 Q I understand. And you testified that a 13 POSA may know -- may have a different amount of 14 knowledge as of December 27, 2015 than a POSA as 15 of May 2nd, 2019, correct? 16 MR. HENRY: Objection to form. 17 BY THE WITNESS: 18 A I mean, with regards to these patents in 19 this case, the knowledge, the basic knowledge of a 20 person who has a bachelor's degree in computer 21 science and has two years of experience would be 22 virtually the same between those dates.
26 1 MR. HENRY: Objection to form, asked and 2 answered, ambiguous, including with respect to 3 what opinions we're talking about. 4 BY THE WITNESS: 5 A Well, regardless of the dates that the 6 person would have had, again, a bachelor's degree 7 and the equivalent of at least two years of 8 industry experience or academic research 9 experience. 10 BY MS. PIANA: 11 Q So we'll look at some of your specific 12 paragraphs in your declaration, and maybe we'll 13 look and see if you've signified whether your 14 opinion is based on a POSA as of December 27, 2015 15 or a POSA as of May 2nd, 2019, and if you haven't, 16 then I will ask you those questions. 17 MR. HENRY: Objection to form. Is there a 18 question there or just a narrative? 19 MS. PIANA: That's a great question, 20 Counsel. It was just a clarifying narrative. 21 BY MS. PIANA: 22 Q But here's a question.	28 1 BY MS. PIANA: 2 Q So is it your testimony that in these 3 cases with this technology, the date for the POSA 4 does not matter? 5 MR. HENRY: Objection to form, 6 mischaracterizes the witness's testimony. 7 BY THE WITNESS: 8 A No, I didn't say that. I said that -- I 9 didn't say that. 10 BY MS. PIANA: 11 Q Okay. I'm trying to understand what you 12 did say. 13 A What I said was that a person who has a 14 bachelor's degree in computer science or 15 engineering and has two years of experience would 16 have had at those dates virtually the same 17 understanding of the field and the knowledge. 18 Q So a POSA's knowledge as of -- I'll just 19 use a year for shorthand. 20 A POSA's knowledge as of 2015 would be 21 about the same as a POSA's knowledge as of 2019; 22 is that what you're saying?

29 1 MR. HENRY: Objection to form, 2 mischaracterizes testimony. 3 BY THE WITNESS: 4 A No. That's not what I said. 5 What I said was that the POSA would have 6 had the same background, the same bachelor's and 7 industry background or the equivalent thereof. 8 BY MS. PIANA: 9 Q So what a POSA would know as of 2015 10 knowledge would be the same as what a POSA would 11 know as of 2019? 12 MR. HENRY: Objection to form, asked and 13 answered, mischaracterizes testimony. 14 BY THE WITNESS: 15 A So, again, the fact that the person is a 16 person of ordinary skill in the art, right, I want 17 to underline the ordinary skill in the art, but 18 has a bachelor's degree and two years of 19 experience would have given them that fundamental 20 knowledge that would have been essentially the 21 same. 22 BY MS. PIANA:	31 1 foundation. 2 BY THE WITNESS: 3 A They could. You know, I often say some 4 things change, some things stay the same. 5 BY MS. PIANA: 6 Q So in your opinions in this declaration, 7 are you applying a different POSA in 2019 versus a 8 POSA in 2015? 9 MR. HENRY: Objection to form, asked and 10 answered. 11 BY THE WITNESS: 12 A So as I said before, the definition that I 13 am applying is a person who has a bachelor's 14 degree, and -- a bachelor's degree in computer 15 science, engineering or affiliated fields and at 16 least two years of industry experience. 17 BY MS. PIANA: 18 Q Right. Would a person who has a 19 bachelor's degree in computer science and 20 engineering and music technology in 2019 have the 21 benefit of technological advances in the field 22 from 2015?
30 1 Q Were there technological advances in this 2 industry between December 2015, and May 2nd, 2019? 3 MR. HENRY: Objection to form, calls for 4 speculation, ambiguous. 5 BY THE WITNESS: 6 A I mean, technology moves forward all the 7 time and so I can say that generally speaking sure 8 there probably were advances. 9 BY MS. PIANA: 10 Q I think you testified previously that 11 technology in this area moves very quickly; is 12 that correct? 13 MR. HENRY: Objection to form. 14 BY THE WITNESS: 15 A Yeah, it could, yeah, in some instances. 16 BY MS. PIANA: 17 Q So would a POSA in 2015 have the 18 benefit -- strike that. 19 Would a POSA in 2019 have the benefit of 20 understanding those technological advances that 21 occurred from 2015 to 2019? 22 MR. HENRY: Objection to form, lacks	32 1 MR. HENRY: Objection to form, asked and 2 answered, lacks foundation. 3 BY THE WITNESS: 4 A They might. They might, but not 5 necessarily. 6 BY MS. PIANA: 7 Q But would you agree that somebody who has 8 a bachelor's degree in computer science, 9 engineering, music technology, part of getting a 10 bachelor's degree is understanding what the 11 technology is at that date. 12 Would you agree with that? 13 MR. HENRY: Objection to form. 14 BY THE WITNESS: 15 A No. It depends on the university you go 16 to, it depends on the specific program you're in, 17 it depends on many factors. 18 BY MS. PIANA: 19 Q So would a POSA in 2019 be different than 20 a POSA in 2015? 21 MR. HENRY: Objection to form, asked and 22 answered.

33 1 BY THE WITNESS: 2 A No, they wouldn't be. So I am considering 3 the same person to be a POSA -- a person who had 4 the same educational background and the same 5 industry experience. 6 BY MS. PIANA: 7 Q But those POSAs may be different, correct? 8 MR. HENRY: Objection to form, asked and 9 answered. 10 BY THE WITNESS: 11 A They wouldn't be different. Again, they 12 would have the same education background and they 13 would have the same equivalent of industry 14 experience. 15 BY MS. PIANA: 16 Q Would a POSA in 2019 have additional 17 information about technology than a POSA in 2015? 18 A Maybe. I guess it depends. 19 Q As part of your education and your 20 experience, did you have additional knowledge in 21 2019 versus what you knew in 2015 about this 22 field?	35 1 immersive audio in 2019 than you did in 2015? 2 A I did because I read articles and go to 3 conferences to continue developing my expertise in 4 the field. 5 Q And so would a POSA have had additional 6 knowledge in the field of spacial and immersive 7 audio in 2019 versus 2015? 8 A Again, as I said. It depends. So a POSA 9 is a person of ordinary skill, and a person of 10 ordinary skill may or may not have had additional 11 training or knowledge between 2015 and 2019. 12 Q So which version of a POSA have you used 13 in making your opinions in this declaration? 14 MR. HENRY: Objection to form, asked and 15 answered, ambiguous including with respect to what 16 opinions we're talking about. 17 BY THE WITNESS: 18 A So, again, the definition of POSA that I 19 am using is a person who has a bachelor's degree 20 with two years of industry experience. 21 BY MS. PIANA: 22 Q Right. And is that person in December 27,
34 1 A Well, my job is to read papers, go to 2 conferences and read very advanced articles in my 3 field, so I -- that's my job is to learn and to 4 become more of an expert. 5 Q So would you say that you did have 6 additional knowledge about this field in 2019 than 7 you did in 2015? 8 A And when you say "this field", what 9 specific field do you mean? 10 Q What field do you consider yourself to be 11 an expert in? How would you describe that field? 12 MR. HENRY: Objection to form, compound. 13 BY THE WITNESS: 14 A So I think there were two questions there. 15 If we could break them down. 16 BY MS. PIANA: 17 Q Sure. How would you describe the field 18 that you are an expert in? 19 A I would describe that field to be spacial 20 and immersive audio. 21 Q Okay. So would you say that you have 22 additional knowledge in the field of spacial and	36 1 2015 or is that person in 2019? 2 MR. HENRY: Objection to form, asked and 3 answered. 4 BY THE WITNESS: 5 A So the person of both those dates would 6 have had -- because they are a person of ordinary 7 skill they would've had virtually the same type of 8 background. 9 BY MS. PIANA: 10 Q So are you saying that a person of 11 ordinary skill in 2019 would not have had any 12 additional knowledge compared to a person of 13 ordinary skill in 2015? 14 MR. HENRY: Objection to form, asked and 15 answered, mischaracterizes testimony. 16 BY THE WITNESS: 17 A That's not what I'm saying. What I'm 18 saying is that they may or may not have, but since 19 they are a person of ordinary skill with that 20 level of education, with a bachelor's degree and 21 two years of industry experience, their knowledge 22 base would be pretty similar.

37 1 BY MS. PIANA: 2 Q So their knowledge base would be pretty 3 similar even though you said that this area of 4 technology advances rapidly? 5 MR. HENRY: Objection. Form, 6 mischaracterizes testimony. 7 BY THE WITNESS: 8 A As I said before, the -- sure, technology 9 evolves and as I said some things evolve and some 10 things stay the same. So if you want to ask me a 11 specific question about a particular part of the 12 technology that may or may not have evolved, I can 13 answer that question probably better. 14 BY MS. PIANA: 15 Q So you said earlier that a person of 16 ordinary skill in 2019 may or may not have 17 additional technical information versus a person 18 in 2015; is that correct? 19 A They may or may not depending on what 20 specific technology we're talking about. 21 Q We're talking about the area of technology 22 that you are an expert in.	39 1 MR. HENRY: Objection to form. 2 BY THE WITNESS: 3 A I'm applying the same standard for a 4 person of ordinary skill in the art. 5 BY MS. PIANA: 6 Q Regardless of whether that person is in 7 2015 or in 2019? 8 MR. HENRY: Objection to form. 9 BY THE WITNESS: 10 A Again, they are -- since they are a person 11 of ordinary skill, and not have the expertise, 12 let's say, that a person like me would have, they 13 would have had basically the same knowledge, the 14 same ordinary -- person of ordinary skill 15 knowledge. 16 BY MS. PIANA: 17 Q But could that level of ordinary skill 18 knowledge be different in 2019 versus 2015 19 especially in this fast-moving field? 20 MR. HENRY: Objection to form, asked and 21 answered, mischaracterizes testimony. 22 BY THE WITNESS:
38 1 MR. HENRY: Objection to form. 2 BY MS. PIANA: 3 Q Correct? 4 A Yeah, but that's a huge field. 5 Q So when I am reading your opinions in your 6 declaration, how will I know or which version of a 7 person of ordinary skill you are using in 8 providing your opinions? 9 MR. HENRY: Objection to form, calls for 10 speculation. 11 BY THE WITNESS: 12 A So as I said, that person of ordinary 13 skill has the undergraduate degree, bachelor's 14 degree in computer science or engineering, music 15 technology and two years of industry experience. 16 BY MS. PIANA: 17 Q Right. And you said that a person of 18 ordinary skill in 2019 might have more technical 19 experience or more technical knowledge than a 20 person of ordinary skill in 2015, and I'm trying 21 to determine how I know which standard you are 22 applying in your opinions?	40 1 A Can you repeat your question? 2 BY MS. PIANA: 3 Q Sure. Your testimony is that a person of 4 ordinary skill unlike a person like you who has a 5 higher level of skill would have had basically the 6 same knowledge in 2015 or 2019; is that correct? 7 MR. HENRY: Objection to form. 8 BY THE WITNESS: 9 A What I'm saying is a person of ordinary 10 skill would have that same education and same 11 industry experience, same amount of industry 12 experience. 13 BY MS. PIANA: 14 Q Would you expect that same education to be 15 different in 2019 versus 2015? 16 MR. HENRY: Objection to form. 17 BY THE WITNESS: 18 A That depends. That depends on the 19 university. It depends on the program. If you 20 want to give me a specific university, their 21 curriculum at those two dates, I can maybe look at 22 that, but it depends on many factors.

41 1 BY MS. PIANA: 2 Q Is it your testimony that a university 3 would not update their curriculum in a fast-moving 4 field from 2015 to 2019? 5 MR. HENRY: Objection to form, calls for 6 speculation argumentative, ambiguous. 7 BY THE WITNESS: 8 A I don't know. Universities they work in 9 the way they work. So I can't speculate to what 10 each university does in terms of their curriculum. 11 BY MS. PIANA: 12 Q Are you saying that a person -- are you 13 saying that the level of knowledge a person of 14 ordinary skill would have depends on the 15 university they went to? 16 MR. HENRY: Objection to form. 17 BY THE WITNESS: 18 A Even though every university has their own 19 curriculum, there are -- the programs themselves 20 that I state here meaning computer science, 21 engineering and music technology, I would expect a 22 certain level of knowledge and background and	43 1 depend on the university and the curriculum? 2 MR. HENRY: Objection to form, compound. 3 BY THE WITNESS: 4 A So if I answer your first question, would 5 I know what level of knowledge a POSA would have, 6 yes, I would. I expect a POSA with an 7 undergraduate degree in computer science, 8 engineering and music technology to have certain 9 fundamental knowledge which probably wouldn't be 10 very different between 2015 and 2019. 11 BY MS. PIANA: 12 Q So you're saying there would be no 13 difference in the knowledge that a POSA would have 14 as of 2015 versus 2019? 15 MR. HENRY: Objection to form, 16 mischaracterizes testimony. 17 BY THE WITNESS: 18 A That's not what I said. What I said that 19 a bachelor's degree would be -- a bachelor's 20 degree in computer science and engineering and 21 music technology would probably have fairly 22 consistent knowledge, but you also have to
42 1 information that every student would have during a 2 bachelor's degree. 3 BY MS. PIANA: 4 Q Would you expect that that information 5 that is provided in the curriculum be updated 6 between 2015 and 2019 especially in a fast-moving 7 field like in this one? 8 MR. HENRY: Objection to form, calls for 9 speculation, mischaracterizes testimony. 10 BY THE WITNESS: 11 A I don't know what each university does and 12 for undergraduate degrees, for bachelor's degrees. 13 Typically there is more consistency especially 14 when we're talking about specific programs, such 15 as in this case computer science, engineering, 16 music technology, the knowledge is -- you know, 17 can stay consistent, but I can't speculate whether 18 or not universities update their classes or 19 curriculum. 20 BY MS. PIANA: 21 Q Do you know what level of knowledge a POSA 22 would have at December 2015 based on -- would it	44 1 understand that it's not just the courses that are 2 being taught. It's everything around that a POSA 3 would be exposed to and, again, the two years of 4 industry experience at a level of experience that 5 I am considering in my definition of POSA. 6 BY MS. PIANA: 7 Q And in terms of the two years of industry 8 experience, would you expect that industry 9 experience in 2019 would look different than 10 industry experience in 2015? 11 MR. HENRY: Objection to form. Sorry, go 12 ahead, Counsel. I thought you were done. 13 BY MS. PIANA: 14 Q Sorry. In this field? 15 MR. HENRY: Objection to form, ambiguous, 16 calls for speculation. 17 BY THE WITNESS: 18 A So because there was an interruption, can 19 you repeat the question? 20 BY MS. PIANA: 21 Q Sure. In terms of the two years of 22 industry experience that you've included in your

45 1 definition of POSA, would you expect that industry 2 experience to look different in 2019 versus 2015? 3 MR. HENRY: Same objections. 4 BY THE WITNESS: 5 A I would expect there to be two years of 6 industry experience. That industry experience -- 7 the amount of industry experience wouldn't 8 be different. It would be about two years of 9 experience, so it wouldn't be that different. 10 BY MS. PIANA: 11 Q I understand that the amount of industry 12 experience is the same, but would that industry 13 experience look different in 2019 versus 2015? 14 MR. HENRY: Same objections. 15 BY THE WITNESS: 16 A I mean, it could depending on what a 17 person, a specific person is working on but when 18 I'm thinking of a POSA, I'm thinking of a person 19 who has those two years of industry experience in 20 that field. 21 BY MS. PIANA: 22 Q Why don't we move on. Let's talk about	47 1 listening to mono sound, typically the mono sound 2 which is one channel of information would be 3 played to you to your left and your right ear. 4 BY MS. PIANA: 5 Q So would the sound I'm hearing in my left 6 ear if I'm hearing mono sound be different than 7 the sound I'm hearing in my right ear? 8 A If you're listening to mono sound, the 9 sound going to both the left and the right ear 10 would be the same. 11 Q So there would not be a difference in what 12 the user is hearing in the left ear versus the 13 right ear, correct? 14 MR. HENRY: Objection to form. 15 BY THE WITNESS: 16 A Well, the mono sound itself, the audio 17 signal going into the left and the right cups 18 would be the same. What the user experiences 19 might be different because of other factors. 20 BY MS. PIANA: 21 Q What other factors are you referring to? 22 A There could be like if your user -- if
46 1 different types of sound. 2 Can you describe in your own words what 3 mono sound is? 4 A So a mono sound or a monophonic sound is a 5 sound that has one channel of a audio information. 6 Q What does that mean? 7 A That means that there's one channel of 8 sound. 9 Q How would a user experience mono sound? 10 MR. HENRY: Objection to form. 11 BY THE WITNESS: 12 A A user might experience mono sound in many 13 different ways -- let me say, first of all, what 14 do you mean by experience? 15 BY MS. PIANA: 16 Q So if I'm a user and I've got my headset 17 on and what I'm hearing is mono sound, what does 18 it sound like to me as a user? 19 MR. HENRY: Objection to form. 20 BY THE WITNESS: 21 A So if in that specific situation you're a 22 user and you have headphones on and you're	48 1 your headphones are not calibrated, there could be 2 other, you know, perceptual factors why the user 3 is not hearing the same sound. 4 Q But the signal that's going to the left 5 ear and the right ear is the same if it's mono 6 sound; is that correct? 7 A So, yes, there is just one channel of 8 audio and that same channel of audio is presented 9 to the left ear and to the right ear. 10 Q What do you mean by a channel? Could you 11 describe that in more detail? 12 A Sure. A channel is a signal, one signal. 13 Q What about stereo sound? How does stereo 14 sound differ from what you're described as mono 15 sound? 16 A So in contrast to mono sound which has one 17 channel, one signal of information, stereo has two 18 channels of information. 19 Q How does that change the user experience? 20 MR. HENRY: Objection to form, ambiguous. 21 BY THE WITNESS: 22 A Well, stereo sound might change the user

49 1 experience in terms of -- because so stereo sound 2 allows you to add a difference in, you know, 3 something typically it's a level difference 4 between those two channels of information. It 5 might change how the user experiences -- hears the 6 sound because a different channel is presented to 7 the left ear and a different channel is presented 8 to the right ear. 9 BY MS. PIANA: 10 Q Do you have a layperson's example that 11 would compare a user's experience of stereo versus 12 mono? 13 MR. HENRY: Objection to form. 14 BY THE WITNESS: 15 A In terms of comparing of the user's 16 experience, what do you mean by that? 17 BY MS. PIANA: 18 Q So if you were explaining to my 78-year 19 old grandmother the difference between mono and 20 stereo sound, how would you explain that to her? 21 MR. HENRY: Objection to form, calls for 22 speculation.	51 1 Dr. Roginska, between mono sound and stereo sound? 2 A Well, you were asking about the definition 3 of mono sound and stereo sound, so the definition 4 of mono sound is one channel of audio whereas the 5 definition of stereo sound is two channels of 6 audio. 7 Q I'm trying to understand what does that 8 mean to somebody who is listening to mono versus 9 stereo? 10 A What that means to a person would be that 11 mono sound if we go back to our example listening 12 over headphones, and it's exactly the same signal 13 going to the left and the right headphone, and the 14 ears are receiving exactly the same signal barring 15 any kind of hearing disorders, that means that in 16 monophonic sound would be positioned inside my 17 head in the center of my head. 18 Q What about stereo sound? 19 A Stereo sound because now we have two 20 channels of audio information that may vary in 21 level, that means that I may be able to move the 22 stereo sound between my left ear and the right
50 1 BY THE WITNESS: 2 A Well, to your 78-year-old grandmother, I 3 would explain that mono sound, again, will present 4 one channel of information, and to your 5 grandmother specifically, I would explain, okay, 6 we're going to have one speaker, forget about 7 headphones, we're not even going to go there, one 8 speaker and there's going to be sound played over 9 that one speaker. 10 Stereo we will have two speakers and there 11 will be a signal going to the left speaker and a 12 signal going to the right speaker. 13 BY MS. PIANA: 14 Q How would she be able to tell the 15 difference between mono sound and stereo sound? 16 MR. HENRY: Objection to form, calls for 17 speculation. 18 BY THE WITNESS: 19 A I don't know how your grandmother would 20 perceive the difference to tell the truth. 21 BY MS. PIANA: 22 Q How do you perceive the difference,	52 1 ear, but because it's stereo and the only thing 2 that we're adjusting is level, that sound would 3 still appear to be coming from somewhere between 4 the left and the right ear. 5 Q What do you mean by making an adjustment 6 in level? 7 A That's fundamentally how stereo sound 8 works. You can adjust the level between the 9 signal going to the left channel and the signal 10 going to the right channel to create what's called 11 a phantom image somewhere between if we have -- 12 whether it's speakers or headphones somewhere 13 between the speakers or the headphones. 14 Q When you say you can adjust the level 15 between the signal going to the left channel, is 16 that adjusting the strength of the signal? 17 A Yeah. Changing the volume, the level. 18 Q So when you say that stereo sound has two 19 channels of information and those two channels may 20 vary in level, are you saying they may vary in 21 volume? 22 A I guess you could say that, yeah. Sure.

53 1 Q Would there be anything else that would be 2 different besides the volume? 3 MR. HENRY: Objection to form. 4 BY THE WITNESS: 5 A In stereo the only thing that you adjust 6 is the level between the two channels. 7 BY MS. PIANA: 8 Q So okay and when you adjust the level 9 between the two channels in stereo, the only thing 10 that you're adjusting is the volume? 11 MR. HENRY: Objection to form, asked and 12 answered. 13 BY THE WITNESS: 14 A What you're adjusting is the level between 15 the left and the right channel. 16 BY MS. PIANA: 17 Q Is that level that you're adjusting 18 between the left and the right channel the volume? 19 A I didn't call it the volume. When we say 20 volume, we typically mean the overall volume. I 21 would say we're adjusting the level or maybe the 22 intensity between the left and the right channels.	55 1 adjustment of the level of the particular channel 2 signal. 3 Q So you said that level means intensity and 4 intensity means level. I'm still trying to 5 understand what you mean by level or intensity. 6 A How loud it is. 7 Q So adjusting the level between the signal 8 going to the left ear and the signal going to the 9 right ear means adjusting how loud the signal is 10 that's going to the left ear versus the signal 11 that's going to the right ear? 12 A It is adjusting the amplitude or the 13 intensity of that signal. I want to make one 14 clarification, how loud something is is more of a 15 perceptual factor and when we're talking about 16 stereo we're talking about an adjustment of the 17 actual signal? 18 Q Can you explain that to me? 19 A Sure. So when we're talking about 20 changing the intensity in the stereo signal 21 between the left and the right channels, we are 22 changing the level or the intensity or the
54 1 Q So you mentioned that -- strike that. 2 If volume does not had mean overall volume 3 and it means the individual volume of the left 4 versus the right channel -- sorry, the left versus 5 the right signal, would you agree with the 6 statement that what is being adjusted in stereo is 7 the volume of the left signal versus the volume of 8 the right signal? 9 MR. HENRY: Objection to form. 10 BY THE WITNESS: 11 A I really wouldn't use the word volume. I 12 mean, volume typically refers to -- the volume 13 knob, so you're adjusting the volume of the entire 14 signal. When we're adjusting stereo signal, we're 15 really adjusting the level of the signal of the 16 left and the right channel. 17 BY MS. PIANA: 18 Q So what does a difference in level mean? 19 A It's a difference in intensity of the 20 signal. 21 Q What do you mean by intensity? 22 A I hate to use the word level, but it's an	56 1 amplitude is another way of thinking about it of 2 the actual signal. We are not going into how loud 3 it is and because loud is more of a perceptual, 4 it's a way to how you perceive a signal, the 5 signal strength. 6 Q So with stereo, the amplitude of the 7 signal going to the left ear can be adjusted 8 relative to the amplitude of the signal going to 9 the right ear, correct? 10 A Yeah, the signal of the left and the 11 right -- yeah, the left and the right signal can 12 be adjusted in amplitude. 13 Q So are you saying level means amplitude 14 here? 15 A I would say virtually they are probably 16 very, very similar. There are some minor 17 differences what amplitude and level is commonly 18 recognized to be virtually the same thing. 19 Q What about binaural sound, how would you 20 describe binaural sound? 21 A Binaural sound is a sound that has two 22 channels of information a left and a right but in

57 1 a binaural sound you have three important cues 2 that are present, the ITD, the ILD and spectral 3 coloration. 4 Q Let's take those one by one. 5 What is the ITD? 6 A The ITD is the interaural time difference. 7 Q What does that mean? 8 A That means that interaural, between the 9 two ears. It's the time difference of arrival 10 between the two ears. 11 Q Is the time difference of what arrival 12 between the two ears? 13 A Of the arrival of the sound. 14 Q Would you agree it's the time difference 15 of the arrival of the sound between the two ears? 16 A Yes. 17 Q So with binaural sound in the ITD, the 18 left ear may receive the sound at different time 19 than the right ear? 20 MR. HENRY: Objection to form. 21 BY THE WITNESS: 22 A With the ITD, but within the scope of the	59 1 Q How would you define level in this 2 context? 3 A In this context in the same way as we did 4 before, it's the difference in intensity between 5 the left and the right ear. In fact, the ILD is 6 sometimes referred to as the IID, the interaural 7 intensity difference. 8 Q The third cue you mentioned I think was 9 spectral coloration, did I get that right? 10 A Yes. 11 Q Okay. Tell me about spectral coloration. 12 A So spectral coloration refers to the 13 filtering characteristics that the size of our 14 head, our bodies, our torsos, and in particular 15 our pinnas or the outer part of the ear, how those 16 contribute to changing the color of the sound that 17 arrives in each ear depending on the direction 18 that that sound is coming from. 19 Q What do you mean by changing the color of 20 the sound? 21 A I mean, changing the frequency spectrum of 22 the sound.
58 1 distance of the two ears, so the ITD, yes, it's a 2 difference. It's an interaural time difference, 3 and the left ear and the right ear might receive 4 it at a different time, but it is confined between 5 the distance of the two ears. 6 BY MS. PIANA: 7 Q What is an example where the left ear 8 would receive the sound at a different time than 9 the right ear? 10 A An example would be if you have a sound 11 that is coming, for example, from directly to your 12 right in that case the right ear receives the 13 sound earlier than the left ear. 14 Q What about ILD, what is that? 15 A The ILD is the interaural level 16 difference. 17 Q There's that word again, level. 18 What does that mean? 19 A So it's the difference of level between 20 the left and the right ear. So it's the 21 difference of level of the sound that's arriving 22 at the left ear versus the right ear.	60 1 Q What does that mean? 2 A It means, it for example, maybe 3 attenuating a particular frequency and boosting 4 another frequency depending on the direction of 5 the sound that it's coming from. 6 MR. HENRY: Counsel, I have to interrupt. 7 It appears our videographer has disconnected. 8 MS. PIANA: Oh, dear. 9 MR. HENRY: It's a good time for a break. 10 We've been going for a little over an hour. 11 MS. PIANA: Yes, sounds good. Let's go 12 off the record and we'll come back in, say, 10 13 minutes or so. 14 AV TECH PLUMMER: And I will try to get a 15 hold of him. 16 MS. PIANA: Okay. Thank you, Mr. Plummer. 17 (A recess was had.) 18 THE VIDEOGRAPHER: We are going back on 19 the record at 10:55 a.m. Eastern time. 20 THE WITNESS: It's 11:55 Eastern time 21 time. 22 THE VIDEOGRAPHER: Central time. You may

61 1 begin. 2 MS. PIANA: All right. Thank you. 3 BY MS. PIANA: 4 Q Dr. Roginska, before the break we were 5 talking about what it means to change the color of 6 the sound. I'll just restate my last question. 7 So what does it mean to change the 8 frequency spectrum of the sound? 9 A It means to attenuate or lower certain 10 frequencies in the spectrum. 11 Q What do you mean by attenuate? 12 A Make them lower in level or volume. 13 Q So you mentioned it means to attenuate or 14 lower certain frequencies of the spectrum. 15 What does it mean to lower a frequency of 16 the spectrum? 17 A It means to in general terms increase or 18 decrease the level of a particular frequency. 19 Q I think you said lower a frequency of the 20 spectrum, right, so would that include increasing 21 the frequency of the spectrum? 22 A Well, what I said was that you could --	63 1 A A sound at a low frequency sounds like 2 this... and a sound at a high frequency sounds... 3 so low pitch/high pitch. 4 Q All right. Thank you. I didn't even hear 5 your high frequency sound so maybe I need to get 6 my ears checked, but that's another subject. 7 Okay. So you were talking about binaural 8 sound has these three important cues, the ITD, the 9 ILD and this spectral coloration. 10 Does mono sound have those same cues, any 11 of them? 12 A Mono sound doesn't have interaural time 13 differences, mono sound doesn't have interaural 14 level differences, mono sound -- a sound in a 15 monophonic signal can be changed in frequency, 16 sure, an equalizer, for example, might do that, 17 but it wouldn't have the spectral coloration that 18 as I mentioned before the head, the torso, and in 19 particular the pinna, the outer ears would 20 superimpose on the sound that is reaching an ear, 21 a monophonic sound would not have that. 22 Q What about a stereo sound, would a stereo
62 1 changing the spectral coloration means you're 2 either increasing or decreasing the level of a 3 particular frequency for each of the frequencies 4 that you want to affect. 5 Q What do you mean by a frequency? 6 A So I mean the frequencies that a human 7 hears, and that is between 20 hertz and 8 20 kilohertz. 9 Q How does a sound at a frequency of 20 10 hertz sound to a user versus a sound at 11 20 kilohertz? 12 A Well, a sound at 20 hertz is a very low 13 frequency. It's the lowest frequency that a human 14 typically can hear. Of course, that depends on 15 age. And then a sound that is at 20 kilohertz is 16 a very high frequency is and typically is at the 17 highest range at which a human ear can hear. 18 Q A sound at 20 hertz you mentioned is at a 19 low frequency. 20 Would that mean that it sounds to a user 21 to be a low or a deep sound as opposed to a high 22 pitched sound?	64 1 sound have any of these three important cues? 2 A So a stereo sound wouldn't have ITDs. A 3 stereo sound does have level differences between 4 the left and the right channel, but they're not 5 necessarily the interaural level differences. 6 Q Can you explain what you mean by that? 7 A Sure. Interaural level differences are 8 level differences that occur because of the 9 attenuation that happens. Because of the head, 10 the head behaves as an obstacle when the sound is 11 coming from one particular direction. 12 So the interaural level differences are 13 specific to how the size and the shape of the head 14 impact the sound arriving at the left and the 15 right ear that's binaural. 16 Stereo means when you're adjusting the 17 level of the left and the right channel it doesn't 18 necessarily have to be interaural level, it could 19 just be a level adjustment. 20 Q Would stereo have an interaural level 21 adjustment? 22 MR. HENRY: Objection to form.

65 1 BY THE WITNESS: 2 A A stereo signal might have a level 3 difference, but, I mean, it may coincidentally be 4 the same as a value for an interaural level 5 difference, but it would not be an interaural 6 level difference. 7 BY MS. PIANA: 8 Q What are some of the advantages of using 9 binaural sound? 10 MR. HENRY: Objection to form, ambiguous. 11 BY THE WITNESS: 12 A Can you be more specific and with regards 13 to what? 14 BY MS. PIANA: 15 Q Sure. How about a virtual reality game, 16 what are some of the advantages of using binaural 17 sound in a virtual reality claim? 18 A So binaural sound allows you to position 19 an object at a specific location in a 20 three-dimensional space, so around a listener. 21 Q Can you tell me what you mean by 22 "positioning an object"?	67 1 it might shift by stereo sound will not allow you 2 to position the sound in a three-dimensional 3 space. 4 BY MS. PIANA: 5 Q What about mono sound? 6 A Mono sound doesn't allow you -- it doesn't 7 have the capability to locate a sound in a 8 three-dimensional space. 9 Q So the only type of sound that allows you 10 to locate an object -- strike that. 11 The only type of sound that allows you to 12 locate a sound in a three-dimensional space is 13 binaural? 14 MR. HENRY: Objection to form, 15 mischaracterizes testimony. 16 BY THE WITNESS: 17 A I don't think your question was 18 technically accurate. Can you repeat that? I 19 want to make sure I get it right. 20 BY MS. PIANA: 21 Q Sure. You mentioned that binaural sound 22 allows you to position the sound in a particular
66 1 A Sure, when you have an element in a game, 2 binaural sound gives you the capability of 3 positioning the sound to appear as it's coming 4 from that specific location. 5 Q So are you saying that a binaural sound 6 allows you to know the location of the sound 7 source? 8 A Well, the cues that are contained in 9 binaural sound, ITDs, ILDs and spectral coloration 10 together allow you to position a sound and process 11 the sound with the intent of putting it in a 12 specific location. How the user perceives that, 13 you know, that's a whole other question, but 14 through the process of adding the cues of the ITD, 15 ILD and spectral coloration, we can attempt and 16 position the sound in a particular location. 17 Q Can stereo sound do that? 18 MR. HENRY: Objection to form. 19 BY THE WITNESS: 20 A Stereo sound because it does not have 21 those three cues that I mentioned, while with 22 stereo sound the apparent phantom image as we call	68 1 location; is that correct? 2 A So the cues that we mentioned, the ITD, 3 ILD and spectral coloration give you the ability 4 to position a sound in a three-dimensional space. 5 Q And you mentioned that or you testified 6 that stereo sound does not have the ability of 7 positioning a sound in a three-dimensional space; 8 is that correct? 9 MR. HENRY: Objection to form. 10 BY THE WITNESS: 11 A I testified that stereo sound does not 12 give you the ability to position a sound in 13 three-dimensional space. 14 BY MS. PIANA: 15 Q You also testified that mono sound doesn't 16 give you the ability to position the sound in a 17 three-dimensional space; is that correct? 18 A That's correct. 19 Q So the only type of sound that gives you 20 the ability to position a sound in a 21 three-dimensional space is binaural; is that 22 correct?

69 1 MR. HENRY: Objection to form. 2 BY THE WITNESS: 3 A No, that's -- well, that's not the only 4 kind of sound. There are other techniques and 5 methods of positioning sound in a 6 three-dimensional space besides binaural sound. 7 BY MS. PIANA: 8 Q Are those other techniques stereo sound? 9 A Stereo wouldn't allow you to position a 10 sound in three-dimensional space. 11 Q And you already testified that mono sound 12 does not give you the ability to position a sound 13 in three-dimensional space, correct? 14 MR. HENRY: Objection to form, asked and 15 answered. 16 BY THE WITNESS: 17 A That's right. 18 BY MS. PIANA: 19 Q So what are these other techniques besides 20 binaural sound that would give you the ability to 21 position a sound in three-dimensional space? 22 A I can give you some examples. There are	71 1 to provide realistic sound in the VR environment, 2 a person of ordinary skill in the art would have 3 been motivated to use binaural sound as taught by 4 Osman; for example, a POSA would have understood 5 that 3D sound can contribute to the sense of 6 immersivity in a 3D environment as stated in 7 Begault, Exhibit 1038, 13 to 14. 3D audio and 8 binaural synthesis may be used in applications 9 such as games, virtual reality or augmented 10 reality to enhance the realism of 11 computer-generated sound effects supplied to the 12 user stated in there. 13 Further, using binaural sound in VR 14 enables users to work more effectively because 15 appropriate sounds seemingly emits from their 16 proper locations as stated in Begault. 17 Q All right. So in that second sentence 18 where you say: "For example, a POSA would have 19 understood that 3D sound can contribute to the 20 sense of immersivity in a 3D environment," are you 21 referring to a POSA in 2015 or a POSA in 2019? 22 A I'm referring to a POSA, again, that would
70 1 many. 2 Q Okay. 3 A Examples of techniques include surround 4 sound, there is wave field synthesis, there is 5 object-based audio, those are just a few examples. 6 Q Are these examples that you just listed, 7 surround sound, wave field synthesis and 8 object-based audio are those different than 9 binaural sound? 10 A Yes. 11 Q Let's look at your declaration which we've 12 marked as Exhibit 1 already. This is your '179, 13 '184 declaration and let's go to Paragraph 99. 14 That's great. Thank you for blowing that up. 15 Dr. Roginska, do you see Paragraph 99 here 16 on the screen? 17 A I do. 18 Q Let me ask you what did you intend by this 19 testimony -- I'm sorry, about this opinion in 20 Paragraph 99? 21 A Let me just reread this. 22 Well, I intended exactly what I said, that	72 1 have had the level of education and background 2 that I stated earlier. The fact that -- 3D sound 3 and that's been contributing to the sense of 4 immersivity in a 3D environment as stated by 5 Begault has been known and implemented for a very 6 long time. 7 Q Are you saying that the knowledge that a 8 POSA would have been applying in 2015 would be the 9 same as the knowledge as a POSA would be applying 10 in 2019 to understand that 3D sound can contribute 11 to the sense of immersivity in a 3D environment? 12 A I'm saying a POSA, again, would have been 13 a person with that level of education and 14 background, industry or research experience, the 15 POSA would have understood for a very long time 16 that since 3D has been applied and used in systems 17 for decades, before this as stated in Begault they 18 would have known that a 3D sound can contribute to 19 the sense of immersivity in a 3D environment. 20 Q Are you saying with respect to this 21 sentence in your declaration, there is no 22 difference from what a POSA in 2015 would have

73 1 understood about the technology and what a POSA in 2 2019 would have understood about the technology of 3 3D sound and a sense of immersivity? 4 MR. HENRY: Objection to form, asked and 5 answered. 6 BY THE WITNESS: 7 A Again, as I said before a person in 2015 8 or 2019 would have, again, I'm looking at the same 9 background, same experience of the education 10 background and the two years of industry or 11 research experience. It has been known and 12 understood for decades that applying 3D sound does 13 contribute to the sense of immersion in a 14 three-dimensional environment. 15 BY MS. PIANA: 16 Q How does applying 3D sound contribute to 17 that sense of immersivity in a 3D environment? 18 A Well, 3D sound enables a person to -- so 19 3D -- as I state here, 3D audio, binaural 20 synthesis in particular, can be used in 21 applications such as games, virtual reality or 22 augmented reality to enhance the realism of a	75 1 this paragraph that says: "Spacialized audio can 2 be useful to serve as a wave finding aid," and you 3 quote a VR Book there. 4 What is that VR Book? 5 A Sorry, is your question just what the VR 6 Book is? 7 Q Yes. That's my current question, yes. 8 A Let me is just go to the exhibits. 9 So, the VR Book is a book that was written 10 by Jason Jerald in 2015. Sorry, is that the right 11 date? Yes, it was written by Jason Jerald in 2015 12 and contains descriptions of different aspects of 13 virtual reality and including the history of VR, 14 an overview of various realities, talking about 15 immersion presence reality tradeoffs, talks about 16 some aspects of perception in virtual reality. It 17 talks also about adverse health effects and about 18 content creation and interaction in design. 19 Q Were you just reading from a document, 20 then, Dr. Roginska? 21 A I was looking at, yes, Exhibit 1067. 22 Q So you were looking at Exhibit 1067 to
74 1 computer-generated sound effect that is supplied 2 to the user and by that helps improve the 3 immersivity in the 3D environment. 4 Q How does 3D audio or binaural synthesis 5 enhance that synthesis of the 3D sound effect as 6 stated in your declaration? 7 A It helps contribute because 3D sound 8 allows you to position sounds around a listener. 9 Q Is 3D sound the same as binaural sound? 10 MR. HENRY: Objection to form. Asked and 11 answered. 12 BY THE WITNESS: 13 A Binaural sound is a type of 3D sound. 3D 14 sound can be implemented using other methods, and 15 binaural is one of the ways that you can create 3D 16 sound. 17 BY MS. PIANA: 18 Q Let's look at the next paragraph in your 19 declaration, Paragraph 100, and this paragraph is 20 quite long so I will direct you to -- feel free to 21 read the whole paragraph, but I'd like to 22 specifically ask you about the last portion of	76 1 your declaration which is the VR Book; is that 2 correct? 3 A That's correct. 4 Q So we haven't entered Exhibit 1067 to your 5 declaration as an exhibit in this deposition yet. 6 You mentioned that this VR Book was 7 published in 2015; is that correct? 8 A That's correct. 9 Q Would a POSA in 2015 based on knowledge in 10 2015 have this knowledge from the VR Book? 11 A They could if they read the book. 12 Q Would this knowledge from the VR Book that 13 was published in 2015 would it have changed in 14 2019? 15 MR. HENRY: Objection to form. Ambiguous. 16 BY THE WITNESS: 17 A What specific aspects in the book are you 18 referring to? 19 BY MS. PIANA: 20 Q If this portion that you've quoted here in 21 Paragraph 100 of your declaration. 22 A So the part that states that auditory cues

77 1 pay crucial role in everyday life as well as VR 2 including adding awareness of surrounds, adding 3 emotional impact, cueing visual attention, 4 conveying a variety of complex information without 5 taxing the visual system, providing unique cues 6 that cannot be perceived through other sensory 7 systems, that sounds work well for creating 8 situational awareness and can obtain attention 9 independent of visual properties and where one is 10 looking, and that spacialized audio can be useful 11 to serve as a wave finding aid. 12 So if your question is whether this would 13 have changed between 2015 and 2019 that would not 14 have changed between 2015 and 2019. 15 Q This content in paragraph of 11 of your 16 declaration that's quoted all came from this VR 17 Book, correct? 18 MR. HENRY: Objection to form. I think 19 you said Paragraph 11, Counsel, but we're not 20 looking at Paragraph 11. 21 MS. PIANA: Apologies. I'm at 22 Paragraph 100. Thank you. Let me restate.	79 1 would have known, correct? 2 A Correct. 3 Q So a POSA in 2019 would have had the 4 benefit of this VR Book that was published in 5 2015; is that correct? 6 A A POSA in 2019 would have also had access 7 to this book, correct. 8 Q So these statements these statements in 9 Paragraph 100 of your declaration is a POSA in 10 2015 would have had the same technical knowledge 11 based on the VR Book as a POSA in 2019, correct? 12 MR. HENRY: Objection to form, ambiguous. 13 BY THE WITNESS: 14 A Again, when I think about a POSA when I 15 was preparing this declaration, the POSA was a 16 person of a particular experience, education as 17 well as industry or research experience, not two 18 different people. 19 BY MS. PIANA: 20 Q Right. A POSA is not two different people 21 but a POSA in 2015 might have different knowledge 22 than a POSA in 2019, correct?
78 1 BY MS. PIANA: 2 Q This information that you quoted here in 3 Paragraph 100 of your declaration, Dr. Roginska, 4 all of that quoted material came from the VR Book, 5 correct? 6 A That is correct. 7 Q And so a POSA in 2015 would have this VR 8 Book to rely on; is that correct? 9 A It was available to them. 10 Q And would this information in 11 Paragraph 100 of your declaration still apply to a 12 POSA in 2019? 13 MR. HENRY: Objection to form, asked and 14 answered. 15 BY THE WITNESS: 16 A The POSA would have been -- so a person -- 17 somebody who has a bachelor's degree in computer 18 science and with two years of experience, so the 19 POSA would have been virtually the same person. 20 BY MS. PIANA: 21 Q Right but you understand when we talk 22 about a POSA what we talk about is what a POSA	80 1 MR. HENRY: Objection to form, asked and 2 answered, multiple times. 3 BY THE WITNESS: 4 A It would depend on -- again, the POSA 5 would have been the same. The POSA would have had 6 that same educational background and still would 7 have had the two years of research or industry 8 experience and that is what I refer to as a POSA. 9 What specific information they would have they 10 would have access to books, they would have access 11 to other things. 12 So if there's a specific part of the 13 experience that you want to ask me about, I'm 14 happy to answer. 15 BY MS. PIANA: 16 Q So what I'm trying to ask you about is 17 whether a POSA applying knowledge in 2015 would 18 have applied this VR Book and whether a POSA 19 applying knowledge in 2019 would have applied this 20 VR Book? 21 A Any person in 2015 and 2019 who would have 22 had access to this book.

81 1 Q So the information in this Paragraph 100 2 of your declaration is an example where the POSA 3 applying knowledge in 2015 would have had the same 4 access as a POSA applying knowledge in 2019, 5 correct? 6 MR. HENRY: Objection to form. 7 BY THE WITNESS: 8 A So what I said was a person -- so any 9 person in 2015 or later, right, between -- it 10 could be 2024, would have access to this book. 11 BY MS. PIANA: 12 Q Right. But what we're looking at in 13 Paragraph 100 of your declaration is your opinion, 14 correct? 15 A That's correct. 16 Q And your opinion states that a POSA 17 understood and then you quote from this VR Book 18 that was published in 2015, correct? 19 A Yes. 20 Q So I'm trying to establish whether this is 21 a POSA in 2015 applying knowledge or a POSA in 22 2019 applying knowledge?	83 1 Q So are you saying that with regard to this 2 opinion in Paragraph 100 of your declaration it 3 doesn't matter whether we are applying a 2015 POSA 4 or a 2019 POSA? 5 MR. HENRY: Objection to form, 6 mischaracterizes testimony. 7 BY THE WITNESS: 8 A So. No, what I said is that a person of 9 ordinary skill in the art would have had access to 10 this 2015 book. 11 BY MS. PIANA: 12 Q And would a person of skill in the art in 13 2019 have had access to this 2015 book? 14 A A person -- any person after the year 2015 15 would have had access to this book because it was 16 published in 2015. 17 Q Right and the specific person we're 18 talking about here in your declaration generally 19 and in Paragraph 100 specifically is this person 20 of skill in the art, the POSA, right, not just any 21 old person, right, we're talking about a person of 22 ordinary skill in the art, correct?
82 1 MR. HENRY: Objection to form. 2 BY THE WITNESS: 3 A What Paragraph 100 states is that a POSA 4 understood, and by POSA, again, I mean a person 5 who at the time would have had a bachelor's degree 6 and would have had two years of experience in the 7 industry or in research, would have had access to 8 this 2015 book. 9 BY MS. PIANA: 10 Q Are you talking about a 2015 POSA or a 11 2019 POSA? 12 MR. HENRY: Objection to form, asked and 13 answered, multiple times. 14 BY THE WITNESS: 15 A So, again, the person of ordinary skill in 16 the art would have -- 2015, 2019 would have had 17 the same basic knowledge, the same fundamental 18 knowledge because if they've had an undergraduate 19 degree in computer science or engineering or music 20 technology and because they would have had two 21 years of industry or research experience. 22 BY MS. PIANA:	84 1 MR. HENRY: Objection to form. 2 BY THE WITNESS: 3 A So a POSA would have had access to this 4 book and would have understood -- if they read the 5 book would have understood what was in the book. 6 BY MS. PIANA: 7 Q When you say a POSA understood here in 8 Paragraph 100 of your declaration, are you talking 9 about a POSA from 2015 or a POSA from 2019? 10 MR. HENRY: Objection to form, asked and 11 answered. 12 BY THE WITNESS: 13 A So again a POSA, a person of ordinary 14 skill in the art as I applied the definition in my 15 declaration would have been a person who would 16 have had a bachelor's degree in the computer 17 science engineering field, music technology, and 18 would have had the two years of research or 19 industry experience. 20 BY MS. PIANA: 21 Q Yes. I understand that's how you've 22 defined the POSA, but we've established already

85 1 that what's important here is the knowledge that a 2 POSA would have, and we've also established that 3 there are two dates that you are applying in your 4 declaration for the definition of POSA. We looked 5 at that back in I believe it was Paragraph 34 of 6 your declaration. 7 So what I'm trying to understand is which 8 POSA are you talking about here in Paragraph 100? 9 Is it a POSA from 2015 applying knowledge in 2015 10 or is it a POSA from 2019 applying knowledge in 11 2019? 12 MR. HENRY: Objection to form, asked and 13 answered, mischaracterizes testimony, 14 mischaracterizes the document. 15 BY THE WITNESS: 16 A So what you said was incorrect. I am not 17 applying two different definitions, right. My 18 definition of POSA is very clear as I stated in 19 the paragraph that you just mentioned, and my 20 definition of POSA is a person with a certain 21 education level and a certain amount of 22 experience.	87 1 the knowledge that I quote here was common 2 knowledge. 3 Q So a POSA applying knowledge in 2019 would 4 also have had knowledge of this VR Book? 5 A A person any time after 2015 would have 6 had access and knowledge about this book. 7 Q So this paragraph quoting the content from 8 the VR Book published in 2015 would have been 9 applied by a POSA in 2015 and also by a POSA in 10 2019, correct? 11 MR. HENRY: Objection to form. Asked and 12 answered. 13 BY THE WITNESS: 14 A Well, the definition of POSA doesn't 15 change. So a person of ordinary skill in the art 16 and with the same education level and background 17 that we discussed earlier would have had access to 18 and known the content of this book. 19 BY MS. PIANA: 20 Q So that person of ordinary skill in the 21 art in 2015 would have had access to this content 22 in this book and that person of ordinary skill in
86 1 BY MS. PIANA: 2 Q Which date is this paragraph based on, 3 this paragraph meaning Paragraph 100 of your 4 declaration? 5 A I'm not sure I understand your question 6 which date is it. 7 Q Is it a POSA applying knowledge in 2015 or 8 a POSA applying knowledge in 2019? 9 MR. HENRY: Objection to form, asked and 10 answered. 11 BY THE WITNESS: 12 A So the book was written in 2015. A 13 person -- a POSA would have had access to a 14 book -- to this book that was published in 2015. 15 This knowledge was common knowledge in 2015. 16 BY MS. PIANA: 17 Q So this book would have been knowledge of 18 a POSA applying knowledge in 2015? 19 A Since this book was published in 2015, 20 anybody after 2015 would have had access to the 21 book and would have -- could have been 22 knowledgeable in the content of this book, and	88 1 the art in 2019 also would have had access to the 2 contents in this book, correct? 3 A Well, any person in 2015 or later would 4 have had access to this book. The POSAs are not 5 different in 2015 or 2019. I mean, the level of 6 knowledge and background would have been virtually 7 the same. 8 Q You mentioned the POSAs are not different 9 in 2015 or 2019, and I understand that your 10 definition of a POSA as stated in paragraph 34 of 11 your declaration says it is somebody who would 12 have had a bachelor's degree in computer science 13 or engineering, music technology and at least two 14 years of industry experience or academic research 15 experience in virtual augmented reality, audio 16 engineering or an equivalent. 17 So the qualifications of your definition 18 of a POSA are not different from 2015 to 2019; is 19 that correct? 20 A The qualifications of the POSA that I 21 describe here are that they would have a 22 bachelor's degree in the fields that you just

89 1 stated, and, in addition, they would have had at 2 least two years of industry or research 3 experience. 4 Q And those qualifications of the POSA as 5 mentioned in Paragraph 34 would not change in 2015 6 versus 2019, correct? 7 A The qualifications of the education and 8 the years of experience wouldn't -- would be, 9 yeah, the same, the qualifications. 10 Q But the knowledge that a POSA would apply 11 in 2015 versus 2019 can could be different, 12 correct? 13 A Well, what specific knowledge are you 14 talking about? 15 Q Well, this is your declaration, 16 Dr. Roginska. So I'm trying to understand when 17 you make a statement as you've done here in that 18 Paragraph 100 that a POSA understood the audio 19 cues, et cetera, whether that is applying the 20 knowledge of a POSA from 2015 or the knowledge of 21 a POSA from 2019? 22 MR. HENRY: Objection to form,	91 1 very clear, but the knowledge that that same 2 person would have in 2015 versus 2019 could change 3 and so what I'm trying to understand is which date 4 are you referring to here in Paragraph 100 of your 5 declaration? 6 MR. HENRY: Objection to form, asked and 7 answered. 8 BY THE WITNESS: 9 A Well, this knowledge would have been 10 available, accessible, so the knowledge that I 11 quote in Paragraph 100 would have been available 12 and accessible to anybody in 2015 or later. 13 BY MS. PIANA: 14 Q Including in 2019? 15 A Including in 2019. 16 Q So this Paragraph 100 is an example of 17 where a POSA in 2015 would be applying the 18 knowledge and a POSA in 2019 would be applying 19 this same knowledge, correct? 20 MR. HENRY: Objection to form, asked and 21 answered. 22 BY THE WITNESS:
90 1 argumentative. 2 BY THE WITNESS: 3 A Okay. So what is described in 4 Paragraph 100, that was common knowledge. That 5 was common knowledge in 2015. It was common 6 knowledge for years before that. 7 BY MS. PIANA: 8 Q So a POSA applying knowledge in 2015 would 9 have had access to this VR Book and a POSA 10 applying knowledge in 2019 would have had access 11 to this VR Book, correct? 12 A Again, you make it sound like they're two 13 different people, but the definition of POSA 14 doesn't change. 15 The POSA at the time of the priority date 16 for the '179 and '184 patents either 2015 or 2019, 17 they would have had the two years of industry and 18 research experience and they would have had a 19 bachelor's degree. Those are the qualifications 20 that I listed. 21 Q I understand. So the POSA qualifications 22 do not change. We've established that, that's	92 1 A So as I said anybody 2015 or -- anybody in 2 2015 or later would have had access to the book 3 and could have applied the knowledge and would 4 have applied the knowledge and the content that 5 was in this book. 6 BY MS. PIANA: 7 Q Including a POSA in 2019, correct? 8 A Including -- yeah, including a person who 9 was working in this field in 2019. 10 Q So yes? 11 MR. HENRY: Objection to form. 12 BY THE WITNESS: 13 A So, again, as I said, so the POSA, the 14 definition of the POSA 2015/2019 doesn't change. 15 It's still the same background. It's still the 16 same education. 17 So my definition of POSA is based on the 18 level of education and experience, industry or 19 research experience. 20 BY MS. PIANA: 21 Q Right. But the knowledge that a person 22 who meets those qualifications could be different

93 1 in 2015 versus 2019, correct? 2 MR. HENRY: Objection to form, asked and 3 answered. 4 BY THE WITNESS: 5 A The level of -- did you say the level of 6 knowledge? 7 BY MS. PIANA: 8 Q I said the knowledge or level of knowledge 9 if you prefer that? 10 MR. HENRY: Same objections, 11 argumentative. 12 BY THE WITNESS: 13 A I guess depending on -- so depending on 14 the specific type of industry experience might be 15 a little different, but I am not looking at 16 specific experience. I'm looking at a person -- 17 I'm using a POSA as a person who has that 18 undergraduate degree and who has -- who comes with 19 the experience that you get by working in the 20 industry or by working in academic research for 21 two years. 22 BY MS. PIANA:	95 1 definition of POSA. I mean, every year a person 2 might have access to another book, but in 2015 3 when we're talking about this book, this book was 4 published in 2015, anybody in 2015 or later would 5 have access to this book and the same knowledge 6 that is in this book. 7 BY MS. PIANA: 8 Q Right. So the opinions you state in 9 Paragraph 100 of your declaration are an example 10 of where a POSA applying knowledge in 2015 would 11 be applying the same knowledge as a POSA in 2019 12 based on this book that was published in 2015? 13 MR. HENRY: Objection to form, asked and 14 answered, ambiguous. 15 BY THE WITNESS: 16 A A person in 2015 or later would have had 17 access to this book and could have used the 18 knowledge that is in this book. 19 BY MS. PIANA: 20 Q So the knowledge of a POSA in 2015 and the 21 knowledge of a POSA in 2019 with respect to this 22 paragraph of your declaration, Paragraph 100,
94 1 Q Right. And so would you expect that 2 person's experience and level of knowledge in 2015 3 to be different than the level of knowledge of 4 someone with that same experience in 2019? 5 MR. HENRY: Objection to form. Asked and 6 answered. 7 BY THE WITNESS: 8 A The -- I would expect them to be, no, more 9 or less the same in 2015 as in 2019. 10 BY MS. PIANA: 11 Q Okay. More or less the same? 12 A Yeah. I mean the -- because they have an 13 undergraduate degree, they have a couple of years 14 of industry or research experience. They would 15 be -- a POSA would be, you know, very similar at 16 those two times. 17 Q So would the knowledge of a POSA in 2019 18 be enriched by whatever has happened in this 19 technological space from 2015 to 2019? 20 MR. HENRY: Objection to form. 21 BY THE WITNESS: 22 A But that is not really relevant to my	96 1 would have been the same, correct? 2 MR. HENRY: Objection to form. 3 BY THE WITNESS: 4 A Again, a person in 2015 or later would 5 have had access to the book and any person after 6 2015 including today in 2024 would have access to 7 this book and to the knowledge of this book. 8 BY MS. PIANA: 9 Q Perhaps I'm overcomplicating. I feel like 10 this is a very simple question so I'm going to try 11 again. Yes or no. 12 Would the knowledge of a POSA in 2015 and 13 the knowledge of a POSA in 2019 with respect to 14 this paragraph of your declaration, Paragraph 100, 15 have been the same? Yes or no. 16 MR. HENRY: Objection to form, asked and 17 answered. 18 BY THE WITNESS: 19 A So I want to make sure that I am answering 20 your question. 21 So my answer to you is that the POSA, the 22 definition of POSA that I'm using is the person

97 1 who has a bachelor's degree and has the relevant 2 experience. With the book having been published 3 in 2015, anybody, any POSA would have had access 4 to this book and, therefore, would have had access 5 to the knowledge that is contained in this book. 6 BY MS. PIANA: 7 Q So any POSA would have had access to this 8 book including a POSA in 2019, correct? 9 A Including -- yeah, a person -- a POSA in 10 2019. 11 Q So a POSA in 2015 and a POSA in 2019 would 12 both be applying this knowledge from the VR Book 13 that's mentioned in Paragraph 100 of your 14 declaration, correct? 15 MR. HENRY: Objection to form. 16 BY THE WITNESS: 17 A Well, a POSA, again, the definition of how 18 I use POSA is relevant to their educational 19 experience -- background, level of education and 20 amount of experience that they have and since this 21 book was published in 2015, anyone had access to 22 this book starting in 2015 and would have	99 1 date which is 2015 or their filing dates which is 2 2019. 3 BY MS. PIANA: 4 Q So those are two different time periods, 5 right? 6 A Those are two different years. 7 Q So knowledge as of 2015 could be different 8 than knowledge as of 2019, right? 9 MR. HENRY: Objection. Asked and 10 answered. 11 BY THE WITNESS: 12 A It could be. I mean, there's four years 13 between them, but my definition of POSA relates to 14 the education background and relates to the 15 experience that that person would have had. 16 BY MS. PIANA: 17 Q So the educational background of someone 18 in 2015 would not have the benefit of anything 19 that was published after 2015, right? 20 A Sure, uh-huh. 21 Q So a POSA applying knowledge in 2015 would 22 not have the benefit of a book that was published
98 1 understood to go to this book to gain knowledge. 2 BY MS. PIANA: 3 Q So you understand, Dr. Roginska, that this 4 concept of a POSA is very critical in determining 5 issues like the ones you've opined on in your 6 declaration including, you know, the validity of 7 patent claims, correct? 8 MR. HENRY: Objection to form, compound. 9 BY THE WITNESS: 10 A I understand that, yes, the definition of 11 POSA is very important with respect to my opinions 12 in this case. 13 BY MS. PIANA: 14 Q So how could a person know when reading 15 the opinions in your declaration which knowledge 16 the POSA is applying, knowledge from 2015 or 17 knowledge from 2019? 18 MR. HENRY: Objection to form. 19 BY THE WITNESS: 20 A When we talk about -- when I talk about a 21 POSA, I'm talking about the educational background 22 and the experience at the time of the priority	100 1 in 2017, correct? 2 A That's correct, yes. 3 Q A POSA applying knowledge in 2019, 4 however, would have the benefit of a book that was 5 published in 2017, correct? 6 A Well, any person in 2019 would have had 7 the access to a book that was published in 2017 8 and a person in 2015 wouldn't have access to that 9 book because it wasn't published yet, sure. 10 Q Right. So a POSA applying knowledge in 11 2019 would have the benefit of a book that was 12 published in 2017, right? 13 MR. HENRY: Objection to form, asked and 14 answered. 15 BY THE WITNESS: 16 A But when I describe a POSA, I am not 17 talking about specific books. I am talking about 18 a person's level of education, and I'm talking 19 about their amount of experience that they 20 have. 21 BY MS. PIANA: 22 Q I understand. I'm just trying to get you

101 1 to answer my question. 2 A person applying knowledge in 2019 -- 3 sorry. Strike that. 4 A POSA applying knowledge in 2019 would 5 have the benefit of a book that was published in 6 2017, right? 7 MR. HENRY: Objection to form, 8 argumentative, asked and answered. 9 BY THE WITNESS: 10 A I think I answered that question that any 11 person in 2019 would have had access to anything 12 published before 2019. 13 BY MS. PIANA: 14 Q So is that a yes? 15 MR. HENRY: Objection to form. 16 BY THE WITNESS: 17 A Again, so my definition of POSA is related 18 to the particular background and education and 19 between 2015 and 2019, the background, shall the 20 bachelor's degree in computer science would not 21 be, you know, fundamentally different and so the 22 type of experience and the type of education I put	103 1 A They might. And I mean, they had access 2 to it. They -- if they read it, they would have 3 had the knowledge from that book. 4 BY MS. PIANA: 5 Q So if the POSA from 2019 had read the book 6 from 2017, the knowledge of the POSA in 2019 would 7 be different than the knowledge of the POSA in 8 2015, correct? 9 MR. HENRY: Objection to form, ambiguous 10 including with respect to what knowledge we're 11 talking about. 12 BY THE WITNESS: 13 A Well, I mean, it's a hypothetical, whether 14 that person they would have access to the book, 15 whether or not they will have read the book, but 16 I'm not basing my definition of POSA on that. I'm 17 basing my definition of POSA based on the 18 education level and based on the amount of 19 experience that that person has. 20 BY MS. PIANA: 21 Q So it is a hypothetical, I agree with 22 that. And in my hypothetical, I'm saying if the
102 1 in here for a POSA is virtually the same. 2 BY MS. PIANA: 3 Q I understand. I'm still trying to get you 4 to answer my question, and I understand Mr. Henry 5 has objected that it's been asked and answered, 6 but it hasn't been answered yet. 7 So would a POSA applying knowledge in 2019 8 have the benefit of a book that was published in 9 2017? 10 MR. HENRY: Objection to form, asked and 11 answered multiple times. 12 BY THE WITNESS: 13 A Yes, a person in 2019 would have the 14 benefit of a book -- would have access also to a 15 book that was published in 2017. 16 BY MS. PIANA: 17 Q So the knowledge of a POSA in 2019 who has 18 access to a book from 2017 would be different than 19 the knowledge of a POSA in 2015 who didn't have 20 access to that same book from 2017, correct? 21 MR. HENRY: Objection to form, ambiguous. 22 BY THE WITNESS:	104 1 POSA from 2019 had read the book from 2017, the 2 knowledge of the POSA in 2019 would be different 3 than the knowledge of the POSA in 2015, correct? 4 MR. HENRY: Same objections. Incomplete 5 hypothetical. 6 BY THE WITNESS: 7 A I mean, it's hard for me to answer. The 8 thing I can tell you is that a person -- let's 9 just relate this back to the VR Book. 10 A person, any person, any POSA in 2015 or 11 later would have had access to the VR Book because 12 it was published in 2015. 13 BY MS. PIANA: 14 Q I understand that. My hypothetical is 15 different than the VR Book which was published in 16 2015. 17 So in my hypothetical, there's a book 18 that's published in 2017, and sitting here today, 19 can you tell me that a POSA in 2019 who has access 20 to a book and reads the book, this is my 21 hypothetical, reads the book from 2017 has a 22 different level of knowledge than a POSA from

105 1 2015? 2 MR. HENRY: Objection to form, asked and 3 answered, ambiguous, incomplete hypothetical. 4 BY THE WITNESS: 5 A So in your hypothetical, which is a big 6 hypothetical, a person who is looking at the world 7 from a 2019 perspective and has access to books 8 and other things from earlier because they have 9 access to those books may possibly have a 10 different level of knowledge. 11 BY MS. PIANA: 12 Q So in your declaration, how can you tell 13 whether you are applying knowledge from a POSA in 14 2019 or a POSA in 2015? 15 MR. HENRY: Objection to form, asked and 16 answered, ambiguous. 17 BY THE WITNESS: 18 A Those are not two different people, right. 19 So a POSA is in my mind related to the level of 20 education and the level of experience regardless 21 of what kind of books they read in 2015 or 2016 or 22 2017. I'm here focused on the level of education	107 1 also the -- everything else that comes along with 2 that including being able to go to a library or to 3 a bookstore and get a book and read a book, a POSA 4 is a person who would have -- who has the ability, 5 who has the background knowledge and has the 6 ability and possibly the experience, the two years 7 of research or industry experience to have that 8 background knowledge for a person that I consider 9 to be a POSA for these patents. 10 BY MS. PIANA: 11 Q So the background knowledge that a POSA 12 would have had in 2015 as you've described the 13 POSA who can go to the library or the bookstore 14 and read a book, that background knowledge of a 15 POSA in 2015 could be different than the 16 background knowledge of a POSA in 2019, correct? 17 A Well, there were different books published 18 between 2015 and 2019, sure. 19 Q Right. So is your opinion in 20 Paragraph 100 based on the POSA with the 21 background knowledge of 2015 or a POSA with the 22 background knowledge in 2019?
106 1 and -- education and everything that comes along 2 with it, knowledge, the ability to read books, and 3 also the industry experience and everything that 4 comes along with that or the academic research 5 experience and everything that comes along with 6 that. 7 MR. HENRY: Counsel, we've gone past an 8 hour now. Is now a good time for a break? 9 MS. PIANA: Very soon. I'm just trying to 10 understand what Dr. Roginska just said. 11 BY MS. PIANA: 12 Q So the POSA is related to the level of 13 education and the level of experience, I 14 understand that, regardless of what kind of books 15 they read in 2015 or 2016 or 2017. So how do we 16 know what knowledge the POSA would have in 2015 17 versus 2019? 18 MR. HENRY: Objection to form. 19 BY THE WITNESS: 20 A Well, a POSA because of their education 21 level and background and because, as I said, 22 education, the knowledge that comes with that, but	108 1 MR. HENRY: Objection to form, asked and 2 answered multiple times. 3 BY THE WITNESS: 4 A It's the same. The book -- I mean, the 5 POSA has the level of education, has the 6 experience that I stated. This book was published 7 in 2015. Anybody after the year 2015 would have 8 had access to this book and this knowledge. 9 BY MS. PIANA: 10 Q So is your opinion in Paragraph 100 of 11 your declaration an example of where the 12 background knowledge of a POSA in 2015 would be 13 the same as the background knowledge of a POSA in 14 2019 because in Paragraph 100 you're citing a book 15 from 2015? 16 MR. HENRY: Objection to form, asked and 17 answered. 18 BY THE WITNESS: 19 A So what I'm saying is that in 20 Paragraph 100 I'm quoting from a book that was 21 written in 2015 and that contains knowledge that 22 would have been available and accessible to

109 1 anybody who would be reading this book which was 2 published in 2015. 3 BY MS. PIANA: 4 Q So available and accessible to a POSA in 5 2015, right? 6 A Available to a person in 2015. 7 Q And also available and accessible to a 8 POSA in 2019, right? 9 A But those are now two different people. 10 Again, when I think of a POSA, 2015, 2019, they 11 are now two different people. I'm always relating 12 it back to their education background and to the 13 amount of research or industry experience that 14 they would have. 15 And I would like to take a break before 16 we -- I would like to take a break. It's been a 17 little over an hour and I need a bio break. 18 MR. HENRY: Let's go off the record. 19 MS. PIANA: One more question. 20 MR. HENRY: The witness has asked for a 21 break, for a rest room break. Let's go off the 22 record. You can ask your question after we come	111 1 A I talked with my attorney. 2 Q Did you talk with your attorney about this 3 concept of the 2015 POSA and the 2019 POSA? 4 A No. 5 Q Are you aware that it is against the PTAB 6 guidelines to talk with your attorney about your 7 testimony during the breaks? 8 A I am. 9 Q Let's go back to where we were before. 10 So you mentioned that when you think of 11 POSA, you are relating it back to their 12 educational background and the amount of research 13 or industry experience that they would have? 14 Do you recall that? 15 A I do. 16 Q Before the break, you had said that the 17 amount of background knowledge that a POSA would 18 have in 2015 could be different than the amount of 19 background knowledge that a POSA would have in 20 2019, correct? 21 A I think what I said was that in 2015, the 22 access to the knowledge in 2015 versus in 2019 the
110 1 back. 2 MS. PIANA: I need 60 seconds. 3 MR. HENRY: She needs a bio break. Let's 4 go off the record. 5 MS. PIANA: Okay. We'll go off the 6 record. 7 THE VIDEOGRAPHER: We are going off the 8 record at 12:05 p.m. Central time. 9 (A recess was had.) 10 THE VIDEOGRAPHER: We're going back on the 11 record at 12:21 p.m. Central time. 12 BY MS. PIANA: 13 Q All right. So, Dr. Roginska, before the 14 break we were talking about the POSAs, 2015 POSA 15 and 2019 POSA, and you mentioned that you are 16 relating it back to their education, background 17 and the amount of research or industry experience 18 that they would have. Before I follow up on that 19 question, we had a break, I hope you're more 20 comfortable now. 21 Did you talk with your attorney during the 22 break?	112 1 books that were published would have been clearly 2 different so a person in 2019 would have had 3 access to all of the publications prior to 2019. 4 Q Right. And whereas a person in 2015 would 5 not have access to any of those publications that 6 had not yet been published in 2015, correct? 7 A That's fair to say. 8 Q That's pretty straightforward, right? 9 A Yes. 10 Q Time machines haven't been invented yet 11 that I am aware of, right? 12 A Not yet. 13 Q Maybe that will be our next deposition. 14 Let's move on to some other terms. We've 15 talked about binaural sound, mono sound, stereo 16 sound, ILDs, ITDs. 17 What about an audio cue, what is an audio 18 cue? 19 A An audio cue is a sound that is meant to 20 indicate something or to notify about something. 21 Q Okay. And so what kinds of somethings 22 would an audio cue indicate? What are some

113 1 examples? 2 A An audio could be really anything, it's 3 the beep in your microwave or when you don't have 4 your seatbelt on in the car or an audio cue could 5 be also a sound that has been maybe even modified 6 in some way to indicate something. I mean, it's a 7 very general question and there are lots of 8 examples. 9 Q Okay. So I might hear a beep when 10 microwave goes off. 11 Would that be an example of an audio cue? 12 A It's technically an auditory display that 13 acts as an audio cue to indicate something. 14 Q Can you help me understand the difference 15 between an audio cue and an auditory display? 16 A An auditory display is a term that is used 17 for a sound that has some meaning, right. As I 18 mentioned to you my microwave beep example that 19 indicates that your food is done or something like 20 that. 21 An audio cue can be anything in audio that 22 is used as a cue. It could be the sound itself.	115 1 can be any of those components, right. So it 2 could be the content itself, it could be -- 3 something about the audio could be the level, it 4 could be how maybe that sound is filtered, how it 5 is presented, it could be any of those things can 6 be an audio cue. 7 Q Okay. But the beep on microwave would be 8 one example of an audio cue? 9 A Sure. 10 Q Okay. But there are other examples of 11 audio cues, like it may have to do with the volume 12 of the sound perhaps? Would that be an example of 13 an audio cue? 14 A That's fair to say. 15 Q So what does it mean to alter an audio 16 cue? 17 A Well, I think that it depends on the 18 context. Is there some somewhere specific that 19 you would like me to look at? 20 Q Sure. Let's look at the '179 patent. 21 MS. PIANA: So, Mr. Plummer, if you could 22 pull from our exhibits the document entitled '179
114 1 It could be the way that sound is processed, okay, 2 that sound is filtered could be an audio cue. 3 Q Okay. So is it fair to say that microwave 4 beep is an example of an audio cue? I'll stop 5 there. 6 A I would describe that -- I would qualify 7 that as an auditory display. 8 Q Okay. So what would be an example of an 9 audio cue? 10 A Anything in an audio signal that is meant 11 to be a cue, so anything inside an audio signal 12 like as I said before, it could be the content, it 13 could be how it's processed, it could be the 14 level, it could be really anything. 15 Q Okay. But it would not be the beep when 16 microwave goes off? 17 A Well, that would be an example of the 18 content, right, so the beep would be the content 19 of the sound. 20 Q Okay. So the beep when microwave goes off 21 would be the content of the audio cue? 22 A Well, as I said a moment ago, a audio cue	116 1 patent. 2 AV TECH PLUMMER: One moment. 3 MS. PIANA: And mark that as I think we're 4 up to Exhibit 2. 5 (A certain document was marked Roginska 6 Deposition Exhibit 2 for identification, 7 as of 02/27/2024.) 8 AV TECH PLUMMER: That's right. 9 BY MS. PIANA: 10 Q Here we are with Exhibit 2. 11 Dr. Roginska, do you recognize this 12 document? 13 A I do. I'm pulling up the paper version of 14 this because it's easier for me to see in paper 15 but, yes, I do see the document. 16 Q The paper version that you are pulling up 17 is a clean copy without any handwritten notes or 18 and notations? 19 A That's correct. 20 Q Great. Why don't we turn to Claim 1 which 21 is towards the back, the bottom of the document. 22 I don't have the PDF page number, but if you just

117 1 keep scrolling, it's the second to last page if 2 that's helpful. Perfect. Right there. 3 Excellent. You read my mind. Thank you for 4 blowing that up. 5 Dr. Roginska, do you see Claim 1 of the 6 '179 patent up here on the screen? 7 A I do. 8 Q Do you understand that this is one of the 9 claims at issue in the IPR proceeding? 10 A That's right. 11 Q Okay. Great. So Claim 1 has five 12 subsections and I have another version of this 13 claim that has -- that's annotated with the 14 subsections but let's see how we can do with this 15 version. 16 If you look down at the last subsection 17 that starts with the word warning, do you see 18 that? 19 A I do. 20 Q It's about at line, what is that, maybe 21 28, so column 46, Line 28, and this subsection of 22 Claim 1 says: "Warning the user that the user is	119 1 So your question is what does alter mean; 2 is that right? 3 Q Yes, that's correct. What does alter 4 audio cues mean in this context here in Claim 1 of 5 the '179 patent? 6 A Yes. So in this context, alter audio cues 7 to prevent the user from experiencing external 8 localization of the sounds, and by lowering the 9 volume of the sounds being provided to the user 10 means that there would be a change, alter in 11 this case would mean a change in the audio cues 12 in a very specific way here, to prevent the user 13 from experiencing external localization of the 14 sounds. 15 Q So what does external localization mean? 16 A External localization or in this case from 17 experiencing external localization, in this case 18 external localization means that a sound is 19 positioned in a space, in a three-dimensional 20 space in this case, so that a user can locate that 21 sound externally from their head. 22 Q Okay. Could you give me an example of
118 1 leaving the 3D virtual environment by filtering, 2 by the DSP, the binaural sound to alter audio cues 3 to prevent the user from experiencing external 4 localization of the sounds and by lowering a 5 volume of the sounds being provided to the user". 6 Do you see that? 7 A I do. 8 Q There's a lot in that one subsection so 9 we'll take it piece by piece. But before we 10 pulled up the '179 patent as Exhibit 2, I had 11 asked you about the meaning of alter and audio cue 12 and you asked for some context. This is the 13 context that I was looking for your response in. 14 So what does it mean to alter an audio cue 15 in the context of the '179 patent? 16 A Thank you for the context because the 17 context is very important especially in this space 18 because here what is written in is the binaural 19 sound to alter audio cues to prevent the user from 20 experiencing external localization of the sounds 21 and by lowering the volume of the sounds being 22 provided to the user.	120 1 when a user might be able to locate a sound 2 externally from their head? 3 A An example of when a user can externally 4 locate a sound from their head is when there is a 5 person in front of you speaking to you, they are 6 it -- you are locating them externally outside 7 your head. It's the airplane that is flying above 8 your head. It's the car down the street. Those 9 are some examples. 10 Q Got it. Thank you, that's helpful. 11 What about in the context of Claim 1 here, 12 so in Claim 1 we're not talking about hearing an 13 airplane in the sky, right? 14 A Right. 15 Q Or talking to somebody who's physically in 16 front of you, right? 17 A That's correct. 18 Q So what context are we talking about here 19 in Claim 1? 20 A So the context here is that limitation 21 that starts with warning as we said, here the 22 context is warning the user that the user is

121 1 leaving the 3D virtual environment by filtering 2 via DSP the binaural sound to alter the cues to 3 prevent the user from experiencing external 4 localization of the sounds. And by lowering the 5 volume of the sounds being provided to the user. 6 So here the context is warning the user 7 that the user is leaving the 3D virtual 8 environment. 9 Q So what does it mean to you to leave the 10 3D virtual environment? 11 A To me what it means to leave a 3D virtual 12 environment is when I am leaving a virtual 13 environment to go into another environment, most 14 likely a physical environment. 15 Q So what about the significance of 3D, what 16 does it mean to leave a 3D virtual environment? 17 A The 3D -- here I think it's important with 18 the word virtual, the 3D virtual environment 19 virtual environment just emphasizes the fact that 20 it's in three dimensions. 21 Q Which environment is in three dimensions? 22 A The 3D, the 3D -- the virtual environment	123 1 disagree, that sound could be 3D sound, do you 2 agree? 3 A It could be. 4 Q Let's get back to altering the audio cues 5 to prevent the user from experiencing external 6 localization of the sounds. 7 So this claim, Claim 1 includes binaural 8 sound. 9 Do you see that? 10 A I see that. 11 Q So that's in limitation we'll call that C, 12 it says processing by a digital signal processor 13 (DSP) in the HMD, sounds with the HRTFs to 14 generate binaural sound that is provided to the 15 user, correct? 16 A Correct. 17 Q What is happening in limitation E the 18 warning step where it says alter audio cues to 19 prevent the user from experiencing external 20 localization of the sounds? 21 A What is happening is that the binaural 22 sound this that is processed by HRTFs as we've
122 1 is in 3D. 2 Q Okay. So you're saying the virtual 3 environment is 3D? 4 A That's what it says here. 5 Q Does a 3D virtual environment require 6 visual images? 7 A It can have virtual images. 8 Q Can you have a 3D virtual environment 9 without any virtual images? 10 A You can have a -- I mean, typically a 3D 11 virtual environment would be culmination of audio 12 and visual, but if I'm even in a virtual 13 environment with images and I close my eyes, I 14 don't have the visual images anymore but I'm still 15 in the virtual environment but it's typical that a 16 virtual environment would have both audio and 17 visual cues. 18 Q But a 3D virtual environment could only 19 have sound, correct? 20 A I suppose it could. 21 Q And the 3D virtual environment that has 22 sound it stands to me, but tell me if you	124 1 noted in limitation C that that binaural sound the 2 cues within the binaural sound and we mentioned 3 the cues before the break but those are the ITD, 4 ILD, spectral coloration, those are examples of 5 cues, those cues would be altered, changed it in 6 some way. 7 Q So they would be changed to prevent the 8 user from experiencing external localization of 9 the sounds, correct? 10 A That's correct. 11 Q So does that mean that the binaural sound 12 is no longer binaural? 13 A It means that the cues here it just says 14 that the cues of that binaural sound would be 15 altered with the intention of preventing the user 16 from experiencing external localization. 17 Q Can a user experience external 18 localization in the context of Claim 1 without 19 binaural sound? 20 A You would need binaural sound -- you would 21 need HRTF processing, you need binaural sound in 22 order to externalize the sound.

125 1 Q So to alter the audio cues to prevent the 2 user from experiencing external localization of 3 the sounds, does that mean the sound is no longer 4 binaural? 5 A Technically that's correct, the sound 6 would no longer be binaural. 7 Q What about lowering the volume of the 8 audio, would lowering the volume of the audio by 9 itself alter the audio cues to prevent the user 10 from experiencing external localization? 11 A So lowering the volume by itself, yes, 12 could alter sound localization. 13 Q If you lower the volume of binaural audio, 14 is it still binaural audio? 15 A It would be – I mean lowering the volume 16 would degrade the binaural audio. 17 Q But would it still be binaural audio or 18 would it have been converted to something else? 19 MR. HENRY: Objection to form, incomplete 20 hypothetical. 21 BY THE WITNESS: 22 A Well, it depends. I mean, lowering the	127 1 by itself prevent the user from experiencing 2 external localization? 3 MR. HENRY: Objection to form, incomplete 4 hypothetical. 5 BY THE WITNESS: 6 A Lowering the volume by itself would 7 degrade the sound. 8 BY MS. PIANA: 9 Q Would that degraded sound prevent the user 10 from experiencing external localization? 11 A It could. 12 Q What about the filtering by the DSP 13 portion of this limitation, what does that mean? 14 MR. HENRY: Objection to form. 15 BY THE WITNESS: 16 A Do you mean the warning the user that the 17 user is leaving the 3D virtual environment by 18 filtering by the DSP? Is that what you're 19 referring to? 20 BY MS. PIANA: 21 Q Yes, yes, thank you. That's what I was 22 referring to.
126 1 volume degrades the sound, degrades the audio and 2 may prevent what we just read which is 3 experiencing external localization. 4 Q Here in limitation 1-E that we've been 5 discussing, it says warning the user that the user 6 is leaving the 3D virtual environment by filtering 7 by the DSP, the binaural sound to alter audio cues 8 to prevent the user from experiencing external 9 localization of the sounds and by lowering a 10 volume of the sounds being provided to the user. 11 So here in Element 1-E there is an "and" 12 there, do you see that, Dr. Roginska? 13 A I see that. 14 Q So are you saying that lowering the volume 15 of the sounds is the same thing as altering audio 16 cues to prevent the user from experiencing 17 external localization of the sounds? 18 MR. HENRY: Objection to form. 19 BY THE WITNESS: 20 A No, that's not what I said. 21 BY MS. PIANA: 22 Q So would lowering a volume of the sounds	128 1 What does it mean to filter by the DSP? 2 A It means to filter sound by a digital 3 signal processor. 4 Q What does it mean to filter sound? 5 A To process the sound. 6 Q Does filter mean the same thing as 7 process? 8 MR. HENRY: Objection to form. 9 BY THE WITNESS: 10 A It doesn't mean exactly the same. 11 Filtering means to change, to process. 12 BY MS. PIANA: 13 Q Is the sound that's being filtered here in 14 limitation 1-E the binaural sound? 15 A So let me understand the question. 16 Are you asking if the sound that is being 17 filtered is the binaural sound? 18 Q Yes. That's what I'm asking. 19 A Can you rephrase because technically 20 that's not – that's not correct. Can you 21 rephrase the question? 22 Q Sure. I'm trying to understand here

129 1 limitation 1-E. 2 A Uh-huh. 3 Q Warning the user that the user is leaving 4 the 3D virtual environment by filtering by the DSP 5 the binaural sound, do you see that? 6 A I see that, yes, okay. 7 Q So why in your opinion is it incorrect to 8 say that the binaural sound is filtered by the 9 DSP? 10 A I misunderstood your question, but thank 11 you for clarifying that. 12 So in this case to answer your previous 13 question the sound that is being filtered is the 14 binaural sound. 15 Q Okay. So the binaural sound is a sound 16 that gets filtered by the DSP, correct? 17 A That's correct. 18 Q And then after the filtering in this 19 context in this claim here, the audio cues have 20 been altered to prevent the user from experiencing 21 external localization of the sounds. 22 Do you see that?	131 1 A So a sound that has been filtered to alter 2 the cues would be altered binaural sound. Now, if 3 the user is prevented from experiencing 4 localization, that just means that they cannot 5 localize the sound externally. But, in general, I 6 would say that if you filter the sound by the DSP 7 to alter the cues significantly and remove 8 binaural cues, right, so we're removing those 9 ILDs, ITD, spectral coloration that we talked 10 about before, to remove those cues, then that is 11 no longer binaural sound by definition. 12 BY MS. PIANA: 13 Q What about filtered by the DSP the 14 binaural sound to alter audio cues to prevent the 15 user from experiencing external localization of 16 the sounds? 17 MR. HENRY: Objection to form. 18 BY MS. PIANA: 19 Q Is -- 20 MR. HENRY: Sorry counsel, my apologies. 21 MS. PIANA: That's okay. 22 BY MS. PIANA:
130 1 A I see that. 2 Q So after the filtering of the binaural 3 sound, is it still binaural? 4 MR. HENRY: Objection to form. 5 BY THE WITNESS: 6 A It would be -- I would say it would be 7 filtered binaural sound. It depends on how it 8 would be filtered by the DSP. 9 BY MS. PIANA: 10 Q Okay. This claim says it would be 11 filtered to prevent the user from experiencing 12 external localization of the sounds. 13 So is sound that does not have any 14 external localization still binaural? 15 MR. HENRY: Objection to form, compound. 16 BY THE WITNESS: 17 A So is your question is sound that doesn't 18 have -- that has altered cues to prevent the user 19 from experiencing external localization, is that 20 still a binaural sound? 21 BY MS. PIANA: 22 Q That is my question, yes.	132 1 Q Is that still binaural sound? 2 A Well, the cues have been altered to remove 3 the binaural cues, then that is no longer a 4 binaural sound. 5 Q What about if the cues have been altered 6 to prevent the user from experiencing external 7 localization? 8 MR. HENRY: Objection to form. 9 BY THE WITNESS: 10 A So if they are being altered to prevent 11 the user from experiencing external localization, 12 so the word you know, experiencing, I'll just tell 13 you this, that experiencing external localization 14 is very difficult even with the HRTFs, right, so 15 we're talking about perception here. 16 I think what's important here is altering 17 audio cues to prevent the user from experiencing 18 external localization, which to me means you're 19 altering to the point of they are no longer there. 20 You no longer have the binaural cues of the ITD, 21 ILD spectral filtering, then the user will not 22 experience external localization.

133 1 BY MS. PIANA: 2 Q So if you are filtering by the DSP the 3 binaural sound to alter audio cues to prevent the 4 user from experiencing external localization of 5 the sounds, it's not binaural sound anymore, 6 correct? 7 MR. HENRY: Objection to form. 8 BY THE WITNESS: 9 A Again, it depends on how you alter them 10 because as I said the definition of binaural sound 11 is sound that contains -- contains those three 12 ITD, ILD and spectral coloration. That's what 13 binaural sound contains so if you alter them to 14 the point of eliminating them, then you're 15 correct, then that is no longer binaural sound but 16 if you alter them in the way maybe it is just 17 degraded binaural or it could be stereo or it 18 could be something else. So it depends on how you 19 alter them. 20 BY MS. PIANA: 21 Q I understand, here the claim says we are 22 altering the audio cues to prevent the user from	135 1 experiencing external localization, right? 2 MR. HENRY: Objection to form, asked and 3 answered. 4 BY THE WITNESS: 5 A That's what that limitation says, to alter 6 the audio cues to prevent the user from 7 experiencing external localization of the sounds. 8 BY MS. PIANA: 9 Q Okay. And then the last part of this 10 limitation says: "And by lowering a volume of the 11 sounds being provided to the user". 12 Do you see that? 13 A I see that. 14 Q So we just established that the sound as 15 described in this Claim 1-E, the sound is no 16 longer binaural after the audio cues have been 17 altered to prevent the user from experiencing 18 external localization of the sounds so that sound 19 is no longer binaural and you lowering the volume 20 of that sound; is that correct? 21 MR. HENRY: Objection to form, compound, 22 mischaracterizes testimony.
134 1 experiencing external localization, right? 2 A That's correct. 3 Q So I understand there are lots of 4 different ways to alter audio cues, but here what 5 we're talking about in this Claim 1-E is we're 6 altering audio cues to prevent the user from 7 experiencing external localization of the sound. 8 And so if the user is prevented from 9 experiencing external localization of the sound, 10 is the sound still binaural? 11 MR. HENRY: Objection to form, asked and 12 answered. 13 BY THE WITNESS: 14 A Yes. As I said, so if the user is 15 prevented from experiencing external localization, 16 then this means to me that the cues have been 17 altered to the point of eliminating the binaural 18 cues, and, therefore, the sound is no longer 19 binaural. 20 BY MS. PIANA: 21 Q Okay. That's what this limitation says, 22 right, it says to prevent the user from	136 1 BY THE WITNESS: 2 A So what the limitation says is that the 3 binaural sound is being -- we're altering the 4 audio cues of the binaural sound to prevent the 5 user from experiencing external localization of 6 the sounds and by lowering a volume of the sounds 7 being provided to the user. 8 BY MS. PIANA: 9 Q So in this limitation 1-E, two separate 10 things happen to the sound, right? First the 11 binaural sound is filtered by the DSP to alter the 12 audio cues to prevent the user from experiencing 13 external localization of the sounds. 14 Do you see that? 15 A Yes, I see that. 16 Q So that's the first thing. 17 The second thing is and, secondly, by 18 lowering a volume of the sounds being provided to 19 the user. 20 Do you see that? 21 MR. HENRY: Objection to form. 22 BY THE WITNESS:

137 1 A I see that line and by lowering the volume 2 of the sounds being provided to the user. 3 BY MS. PIANA: 4 Q Okay. So here in the context of this 5 claim, Claim 1 of the '179, the sound is altered 6 so it is no longer binaural so the volume is 7 lowered, correct? 8 MR. HENRY: Objection to form. 9 BY THE WITNESS: 10 A So this claim the audio cues of the 11 binaural sound are altered so the user no longer 12 experiences external localization so those are 13 altered, changed in some way and the user is also 14 warned, so I want to go back to the beginning of 15 that limitation, warning the user that the user is 16 leaving the 3D virtual environment, by filtering 17 by the DSP but also warning the user by lowering a 18 volume of the sounds being provided to the user. 19 BY MS. PIANA: 20 Q Okay. So earlier you said that after the 21 sound is filtered by the DSP, to prevent the user 22 from experiencing external localization, after	139 1 Q Right, but the claim says you alter the 2 audio cues to prevent the user from experiencing 3 external localization. 4 Do you see that? 5 A I see that. 6 Q So if the user is prevented from 7 experiencing external localization, have the 8 binaural cues been removed? 9 MR. HENRY: Objection to form, asked and 10 answered. 11 BY THE WITNESS: 12 A They could have been degraded. They don't 13 have to have necessarily been removed. They could 14 have been made worse, degraded. But that might 15 prevent the user from experiencing external 16 localization. 17 BY MS. PIANA: 18 Q If a user is prevented from experiencing 19 external localization of the sound, is that sound 20 binaural? 21 MR. HENRY: Objection to form, asked and 22 answered.
138 1 that process happens the sound is no longer 2 binaural, right? 3 MR. HENRY: Objection to form, 4 mischaracterizes testimony. 5 BY THE WITNESS: 6 A I think what I said, I just want to 7 clarify, is that when we're filtering by the DSP 8 the binaural sound to alter the cues to the point 9 of preventing the user from experiencing external 10 localization, to me that means we're removing -- 11 we're changing audio cues, that we're removing the 12 binaural cues in the sound to prevent external 13 localization. 14 However, the altered cues -- I mean, the 15 cues can be altered not to completely remove the 16 binaural cues, they could be diminished, they can 17 be degraded, you know, if we don't remove the ITD 18 or ILD, it would be another type of sound, if we 19 remove, this doesn't say remove, it says alter the 20 audio cues. Only if we remove the audio cues does 21 that sound become not binaural. 22 BY MS. PIANA:	140 1 BY THE WITNESS: 2 A The sound itself, I mean, the sound can 3 contain the binaural cues and so, by definition, 4 if sound contains binaural cues, it is a binaural 5 sound, but if the cues are degraded, altered the 6 cues are altered and the sound is degraded, that 7 might prevent the user from experiencing external 8 localization. 9 BY MS. PIANA: 10 Q Okay. So a user could be prevented from 11 experiencing external localization even if the 12 binaural cues are still present in the sound? 13 A That could happen and I want to just 14 differentiate between two things. 15 Binaural sound is the sound itself, right, 16 it's the signal, and binaural sound is a sound 17 signal that contains binaural cues inside the 18 signal as we talked about the ITD, ILDs, the 19 spectral coloration. 20 The second important thing is that that 21 line that starts to prevent the user from 22 experiencing external localization, that is an

141 1 experience. Now, what is contained in the signal 2 itself and what the user experiences, sometimes 3 they're the same, but if a binaural signal is 4 degraded or the cues are degraded, if the binaural 5 signal is degraded and the cues are still in the 6 sound, it may be altered, but that could 7 technically still be a binaural signal, but 8 because it is a degraded signal, that may prevent 9 the user from experiencing external localization. 10 Q So in that case where the binaural cues 11 have been degraded but it's still a binaural 12 signal, is the user experiencing the binaural 13 sound? 14 MR. HENRY: Objection to form, calls for 15 speculation. 16 BY THE WITNESS: 17 A I mean, so your question is if the cues 18 are degraded and it's still binaural sound, could 19 the user still be experiencing binaural sound? 20 BY MS. PIANA: 21 Q Yes. That's my question. 22 A Well, they may or may not be depending on	143 1 BY MS. PIANA: 2 Q Yes. Sure. 3 Is the user experiencing binaural sound if 4 the user is prevented from experiencing external 5 localization? 6 A If a user is not experiencing external 7 localization, then it wouldn't -- it wouldn't be a 8 binaural sound. 9 Q Okay. So here in limitation 1-E, it says 10 you warn the user by preventing the user from 11 experiencing external localization and by lowering 12 a volume of the sound, correct? 13 A So, yeah, you're warning the user that 14 they are leaving the 3D virtual environment by 15 filtering the binaural sound by altering the cues 16 so that they're not experiencing external 17 localization and you're also warning them by 18 lowering the volume of the sounds being provided 19 to the user. 20 Q Okay. You mentioned degrading in our 21 discussion of Claim 1, but Claim 1 does not 22 include the word degrade; is that right?
142 1 how the cues were altered or degraded. 2 Q What if the cues are altered to prevent 3 the user from experiencing external localization? 4 A But, again, the binaural sound it can 5 still be a binaural sound, a binaural signal, 6 right. That may not change the characteristic of 7 the binaural signal. The experience that the user 8 has in experiencing external localization may 9 change depending on if the signal was degraded. 10 For example, if you have a binaural signal, turn 11 down the volume knob so that the binaural sound, 12 you know, has been degraded, maybe the person is 13 not going to be experiencing external 14 localization. 15 Q So I understand that. 16 Is the user experiencing binaural sound if 17 the user is prevented from experiencing external 18 localization? 19 MR. HENRY: Objection to form. 20 BY THE WITNESS: 21 A Can you repeat that question? It was a 22 lot.	144 1 A That's right. 2 Q Let's look at Claim 7. If we could scroll 3 down, it may be on the next page. It's at the 4 bottom. This one is going to be kind of tricky 5 but thank you. 6 Okay. So in Claim 7, and I'll give you a 7 moment to read it, Dr. Roginska, to familiarize 8 yourself with Claim 7. 9 A Yes. I have read it. 10 Q Okay. Great. So we're going to look at 11 the corresponding sub-limitation, which is I'll 12 call it 7-E, which is the 5th limitation in Claim 13 7. It's the one that starts with the words: 14 "Alerting the user..." 15 Do you see that? 16 A I see that. 17 Q Great. It's at the top of Column 47 18 around Line 3, so that limitation reads: 19 "Alerting the user that the user is leaving the 20 environment by altering processing of the binaural 21 sound to degrade audio cues in order to prevent 22 the user from experiencing external localization

145 1 of the binaural sound". 2 Do you see that? 3 A Yes. 4 Q So some of the words in this limitation 5 7-E are similar or the same as the words in 6 limitation 1-E, but some of them are very 7 different. So let's go through it. 8 So in limitation 7-E it says: "Degrade 9 the audio cues in order to prevent the user from 10 experiencing external localization." 11 What does degrade audio cues mean in this 12 context? 13 MR. HENRY: Objection to form. 14 BY THE WITNESS: 15 A So within the context of this limitation 16 alerting the user that the user is leaving the 17 environment by altering processing the binaural 18 sound to degrade audio cues in order to prevent 19 the user from experiencing external localization 20 of the binaural sound. 21 In this context, I read this as degrading 22 the audio cues could be a number of different	147 1 Q What do you mean by that? 2 A To change them in a way -- to change the 3 audio cues in a way, in a negative way so as to 4 prevent the user from experiencing the external 5 localization. 6 Q So here in limitation 7-E, we say degrade 7 or the claim says rather: "Degrade the audio cues 8 in order to prevent the user from experiencing 9 external localization of the binaural sound." 10 Is that the same result as what was set 11 forth in limitation 1-E which was: "Alter the 12 audio cues to prevent the user from experiencing 13 external localization of the sounds?" 14 Do you end up in the same place here in 15 7-E as you do in limitation 1-E? 16 MR. HENRY: Objection to form, ambiguous. 17 BY THE WITNESS: 18 A Well, in 1-E -- you may end up in the same 19 place in 1-E you're warning the user, I mean, the 20 goal is the same as to warn or alert the user that 21 they're leaving an environment. 22 The difference is also in 1-E we have the
146 1 audio cues, right, but the cues are degraded to 2 the point that the user is prevented from 3 experiencing the external localization of the 4 binaural sound. 5 BY MS. PIANA: 6 Q Okay. Would the audio cues that are being 7 degraded as here in Claim 7 be the same as the 8 audio cues that are being altered in Claim 1? 9 MR. HENRY: Objection to form, ambiguous. 10 BY THE WITNESS: 11 A Well, in Claim 1, limitation 1-E, 12 filtering the binaural sound to alter audio cues 13 to prevent -- I mean, they could be. They could 14 be a number of audio cues that are being altered 15 as in 7-E. But here in 7-E we have the specific 16 word of degrading audio cues, to degrade audio 17 cues. 18 BY MS. PIANA: 19 Q Right. So what does it mean to you to 20 degrade audio cue in the context of this 21 limitation 7-E? 22 A To make them worse.	148 1 specific of the 3D virtual environment that 2 they're leaving, right. 3 BY MS. PIANA: 4 Q Yes. 5 A So -- 6 Q So -- sorry, go ahead. 7 A I was going to say that you may end up in 8 the same place, but the goal here is to alert the 9 user that they are leaving in 1-E that they're 10 leaving the virtual environment, the 3D virtual 11 environment by processing. 12 In 7-E, that limitation states that the 13 user is leaving the environment by altering the 14 processing of the binaural sound to degrade the 15 audio cues so to make them worse, to diminish them 16 in order to prevent the user from experiencing 17 that external localization of the binaural sound. 18 Q Wouldn't you agree that warning is the 19 same thing as alerting? Is that what you're 20 saying? 21 MR. HENRY: Objection to form. 22 BY THE WITNESS:

149 1 A No. Warning and alerting is quite 2 different. 3 BY MS. PIANA: 4 Q What are the differences? 5 A Well, when we are alerting we want to 6 direct the attention of someone to something. 7 When we are warning, a warning is typically 8 related to safety or a hazard. 9 Q Would you of want to be alerted of a 10 hazard? 11 A What do you mean? 12 Q Well, I understood your testimony to be 13 that warning is different than alerting; is that 14 right? 15 MR. HENRY: Objection to form. 16 BY THE WITNESS: 17 A Those are two different words with two 18 different inherent meanings, yeah. 19 BY MS. PIANA: 20 Q Okay. And you testified that when we are 21 warning, a warning is typically related to a 22 safety or a hazard, right?	151 1 carries more gravitas in its message? 2 A I think to anyone there's a difference 3 between alerting and warning including a person of 4 skill in the art. 5 Q And would it matter whether that person of 6 skill in the art was applying knowledge as of 2015 7 versus applying knowledge as of 2019? 8 A I think any person regardless of when 9 would know the difference between an alert and a 10 warning signal. 11 Q You mentioned that the environment in 12 Claim 7 is different than the environment -- 13 strike that. 14 You mentioned that the term in Claim 1 is 15 a 3D virtual environment and the term in Claim 7 16 is an environment, right? 17 A That's what those two lines say. One says 18 3D virtual environment and in 7-E it just states 19 the environment. 20 Q As a person of ordinary skill in the art, 21 do those terms have different meanings? 22 A Well, in 1-E it states very specifically
150 1 A I mean, it could be. It could be. In 2 this case warning the user that the user is 3 leaving the 3D virtual environment is warning 4 about a very specific thing. 5 Q And alerting the user, would you ever 6 alert a user about a safety or a hazard? 7 MR. HENRY: Objection to form, incomplete 8 hypothetical. 9 BY THE WITNESS: 10 A I guess you could alert them to a hazard, 11 sure. 12 BY MS. PIANA: 13 Q In your mind, warnings are different than 14 alerts? 15 MR. HENRY: Objection to form. 16 BY THE WITNESS: 17 A In my mind, a warning is a type of alert 18 that carries a little bit more gravitas in its 19 message. 20 BY MS. PIANA: 21 Q Would a person skill in the art have that 22 opinion that a warning is a type of alert that	152 1 3D virtual environment so it is very specific that 2 this is a 3D virtual environment in 7E it states 3 alerting the user that the user is leaving the 4 environment. So that word doesn't specify a 5 virtual environment. 6 Q When you had testified earlier, 7 Dr. Roginska, that a 3D virtual environment might 8 include a visual image or it could be just be a 9 virtual sound environment, correct? 10 A It could be, but typically it would be an 11 environment that includes both modalities. 12 Q When you say both modalities, could you 13 just clarify what you mean there? 14 A Oh, sure. Including visual and audio. 15 Q Let's go to your declaration, which is 16 Exhibit 1 and look at Paragraph 224. 17 MR. HENRY: Counsel, if you're 18 transitioning, this might be a decent time to 19 break for lunch. It's been an hour and the 20 afternoon is getting away from folks on the east 21 coast. 22 MS. PIANA: Has it already? I am

153 1 transitioning, so that is fine. Let's break for 2 lunch. Should we take 45 minutes? 3 MR. HENRY: Yeah, why don't we try to hit 4 the top of the hour, but we can go off the record 5 and talk about it. 6 THE VIDEOGRAPHER: We are going off the 7 record at 1:22 p.m. Central time. 8 (A lunch recess was had from 1:22 p.m. to 9 2:03 p.m. CST.) 10 11 12 13 14 15 16 17 18 19 20 21 22	155 1 Can you tell me which term Claim 14 uses? 2 A One second. 3 So Claim 14 in the last limitation states: 4 "Alerting the user that the user is leaving the 5 environment by reducing a volume of the binaural 6 sound that localizes from the virtual image and 7 that is being provided to the user." 8 Q So would you agree that the term that's 9 used in Claim 14 is environment and not 3D virtual 10 environment? 11 A In that limitation, that's right. 12 Q Let's look at your declaration which is 13 Exhibit 1, and in particular let's go to 14 Paragraph 224, which should be around Page 138 of 15 the PDF. You're already there. Excellent. 16 So in this paragraph of your declaration, 17 Dr. Roginska, maybe you could read these two 18 sentences here for us for the record. 19 A Sure. "In particular, all of the '179 20 patent's claims directly (or indirectly via their 21 independent claims) recite the HMD/WED sensing or 22 determining when the user is leaving the 3D
154 1 AFTERNOON SESSION 2 THE VIDEOGRAPHER: We're back on the 3 record at 2:03 p.m. Central time. 4 DR. AGNIESZKA ROGINSKA, 5 called as a witness herein, having been previously 6 duly sworn and having testified, was examined and 7 testified further as follows: 8 EXAMINATION (Resumed) 9 BY MS. PIANA: 10 Q Dr. Roginska, before we broke for lunch we 11 were talking about environment and 3D virtual 12 environment. 13 Do you recall that? 14 A I do. 15 Q You had made the point that the term used 16 in Claim 7 is environment, but the term in Claim 1 17 is 3D virtual environment; is that correct? 18 A Yes, the term used in Claim 1-E is 3D 19 virtual environment, and the term that is used in 20 Claim 7-E is meeting the environment. 21 Q While we're here at '179 patent which is 22 Exhibit 2, why don't we look at Claim 14.	156 1 environment and alerting or warning that user of 2 that fact by reducing the sound's volume and/or 3 otherwise altering it. The patent does not 4 mention these features at all". 5 Q In that first sentence of your -- of 6 Paragraph 224 of your declaration, you say: "In 7 particular, all of the '179 patent's claims 8 directly or indirectly via their independent 9 claims recite the HMD/WED sensing or determining 10 when the user is leaving the 3D environment." 11 Do you see that? 12 A That's correct. 13 Q Where in Claim 7 does it say the user is 14 leaving the 3D environment? 15 A In Claim 7, Limitation E states: 16 "Alerting the user that the user is leaving the 17 environment by altering processing of the binaural 18 sound to degrade audio cues in order to prevent 19 the user from experiencing external localization 20 of the binaural sound." 21 So here it states alerting the user that 22 the user is leaving the environment, right.

157 1 And here if we go back to 224, in 2 particular all of the '179 patent's claims 3 directly or indirectly via their independent 4 claims recite the HMD/WED sensing or determining 5 when the user is leaving the environment and 6 altering or warning that user of that fact by 7 reducing the sound's volume and otherwise altering 8 it." 9 So is your question 3D environment versus 10 what is it stated in 7E leaving the environment? 11 Q Yes, that is my question. 12 A To me a 3D environment and environment are 13 really no different. So when 7-E states leaving 14 the environment and in 224 I say sensing or 15 determining when the user is leaving the 3D 16 environment, that is to me the same thing. 17 Q Could a user leave a physical environment 18 and not leave a 3D virtual environment? 19 A So could a user leave a physical 20 environment and not leave a 3D virtual 21 environment; is that the question? 22 Q Yes. That's my question.	159 1 leaving the 3D environment, what kind of 2 environment are you referring to there as a 3D 3 environment? 4 A Well, in this case it could be a virtual 5 environment, but it could also be a physical 6 environment. 7 Q Okay. How would a POSA interpret the 8 difference between a 3D virtual environment and a 9 physical environment? 10 A So a virtual environment means that you 11 are in a virtual -- virtual reality type of 12 environment. A physical environment means you're 13 in the real world. 14 Q Okay. So let's go -- well, tell you what. 15 Let's go to Paragraph 225. 16 A Yes. 17 Q In this paragraph, you state that the '140 18 application and a clarification, do you understand 19 what the '140 application refers to? 20 A I do. 21 Q Can you tell me what that is? 22 A So the '140 application is the most recent
158 1 A I'm not sure I understand. Can you 2 rephrase, please? 3 Q Sure. Well, let me back up. 4 As a person of skill in the art, are you 5 interpreting the term environment to mean the same 6 thing as the term 3D environment? 7 A Yes. To me they are the same. 8 Q And even though the term environment does 9 not include 3D in front of it? 10 A Yes, I have a hard time imagining an 11 environment that is not a 3D environment. 12 Q Are you making a distinction between a 3D 13 environment and a 3D virtual environment? 14 A Yes. 15 Q So the term in Claim 1 is a 3D virtual 16 environment, correct? 17 A The term in Claim 1 is a 3D virtual 18 environment, that's correct. 19 Q And here in your declaration at Paragraph 20 224, your testimony is that all of the '179 21 patent's claims directly or indirectly recite the 22 HMD/WED sensing or determining when the user is	160 1 application, as a parent application to the '179 2 patent. 3 Q What about the '184? 4 A And also the '184 patent. 5 Q Do you understand that the disclosure that 6 is given in the '140 application is the same as 7 the disclosure that is given in the '179 patent 8 and the '184 patent except for the claims? 9 A I understand that the descriptions of the 10 '140 application are in the '179 patent, but that 11 there are -- but not all of them. So there are 12 two factors missing from the '140 application that 13 appear in the '179 patent. 14 Q Okay. And what are those missing factors? 15 A So I talk about these in my declaration. 16 In Paragraph 225, right where you are, let me just 17 refer to this, the '140 application does describe 18 a wide variety of different types of events that 19 may trigger changing sound from binaural sound to 20 stereo sound, mono sound, or altered binaural 21 sound. 22 That's taken from the '140 application,

161 1 Exhibit 128 (sic). 2 However, the '140 application does not 3 describe anywhere, including in the claims, the 4 triggering event of a user leaving the 5 environment, in other words, the '140 application 6 does not give an example of using the user's 7 location to determine that (and to warn or alert) 8 the user that the user is leaving the virtual 9 environment as recited in the claims. 10 Q I'm going to come back to that point in a 11 moment, but it just for clarity on the disclosure, 12 do you understand that the specification of the 13 '179 patent and the '184 patent are the same? 14 A The '179 patent and the '184 patent are 15 almost the same. The difference is in the 16 determining when the user is leaving the 17 environment. That is not present in the '184. 18 Q Sorry. I didn't mean to talk over you 19 there, Dr. Roginska. 20 When I say the specification of the '179 21 patent, do you understand that what I'm referring 22 to is the detailed description of the patent, that	163 1 So the specification of the '140 2 application, and, again, when I say specification 3 I mean the drawings and all of the disclosure up 4 to the claims is the same as the specification of 5 the '179 patent and the '184 patent, correct? 6 A The specifications and the descriptions in 7 the '140 application is not the same. 8 Q Okay. How is it different? 9 A So in the description of -- hold on. Let 10 me go to the '140 application. 11 Q We can enter that as an exhibit if that 12 would be helpful. Why don't we do that. 13 MS. PIANA: Let's see. So Mr. Plummer, if 14 you could find in the exhibit folder, the document 15 that is entitled '140 application and mark that as 16 Exhibit 3. 17 (A certain document was marked Roginska 18 Deposition Exhibit 3 for identification, 19 as of 02/27/2024.) 20 MS. PIANA: Perfect. 21 BY MS. PIANA: 22 Q Dr. Roginska, recognize this document
162 1 portion of the patent? 2 A I do. 3 Q Okay. And the claims of the patent are 4 the numbered paragraphs at the end. We've been 5 looking at some claims from the '179 patent, 6 correct? 7 A Yes. 8 Q So when I say that the specification of 9 the '179 patent is the same as the specification 10 as the '184 patent, what I mean to tell you is 11 that the drawings are the same and everything up 12 to the claims is the same in the '179 patent and 13 the '184 patent. 14 Do you understand that? 15 A Thank you for clarifying that. Yes. I 16 understand. 17 Q Sure. And then the '140 application as 18 you testified is the great-grandparent of both the 19 '179 and '184 patents, correct? 20 A I don't know about the great grandparent 21 but, yes, a parent application, that's correct. 22 Q Thank you. That's better.	164 1 that's up on the screen and has been be marked as 2 Exhibit 3? 3 A Yes, I recognize the document. 4 Q So what is this document? 5 A So this document is the '140 application, 6 which is the most recent application, as a parent 7 application to the '179 and the '184 patent. 8 Q Okay. And so this document here includes 9 some additional information on top of the '140 10 application. 11 Do you see that? So, for example, the 12 page we're looking at here is called Issue 13 Notification. Do you see that? 14 A I see that, yes. 15 Q If you scroll down to -- I'm looking for 16 the -- 17 MR. HENRY: Counsel, this was a bigger 18 document. Could you just give us a second be to 19 make sure it that we've downloaded local copies 20 that we can look through. 21 MS. PIANA: Sure. 22 MR. HENRY: Thanks.

165 1 BY MS. PIANA: 2 Q So this document we're looking at that's 3 been marked as Exhibit 3 was marked as 4 Exhibit 1028 in the IPR if that is helpful for 5 you. 6 MR. HENRY: Yes, that's fine. I'm just 7 trying to pull down the Exhibit 3 that was just 8 stamped and circulated so I'm looking at the same 9 one. 10 MS. PIANA: Okay. Are you there? 11 MR. HENRY: I am, yes. 12 BY MS. PIANA: 13 Q If you scroll down to Page 92 in this -- 14 yes, right there. Thank you. 15 This is the beginning of the application 16 that was filed as the '140 application, correct? 17 A We're on Page 92. Yes. Give me one 18 second. What page are you on? 19 Q I'm on the page that is shown on the 20 screen here. The page number at the bottom of the 21 document is Page 1, but the PDF page number is 92. 22 Do you see that?	167 1 '140 application" which we've just established 2 what that is, "does not give an example of using 3 the user's location to determine that and to warn 4 or alert the user that the user is leaving the 5 virtual environment, as recited in the claims". 6 Do you see that? 7 A I see that, yes. 8 Q The claims, though, Claim 7 and Claim 14 9 use the term environment and not virtual 10 environment, correct? 11 A That's right. 12 Q And so are you saying in this sentence 13 here that virtual environment means environment as 14 used in Claims 7 and 14? 15 MR. HENRY: Objection. Form. 16 BY THE WITNESS: 17 A Well, what I'm saying here in 18 Paragraph 225 is that, again, the '140 application 19 does not give an example of using the user's 20 location to determine and to warn or alert the 21 user that the user is leaving the virtual 22 environment as recited in the claim.
166 1 A I see that, thank you. Yes. 2 Q And so this is the specification of the 3 '140 application that was originally filed, 4 correct? 5 A That's the '140 application, uh-huh, yes. 6 Q And so the disclosure that is in the '140 7 application -- when I say '140 application, I mean 8 starting here at Page 92 of the PDF to the end of 9 the document. The disclosure that's in the '140 10 application is the same as the disclosure that's 11 in the '179 specification and the '184 12 specification. 13 Do you understand that? 14 A I understand that, yes. 15 Q Okay. Super. I just wanted to establish 16 that those three things were the same in terms of 17 the specification, not the claims. Claims are 18 different but the specifications are the same. 19 Okay. 20 Let's go back to your declaration, which 21 is Exhibit 1, and Paragraph 225. At the end of 22 this paragraph, you say: "In other words, the	168 1 BY MS. PIANA: 2 Q Claim 7 does not recite the user is 3 leaving the virtual environment, correct? 4 A Claim 7, that was the 1 Claim 7 doesn't -- 5 Claim 7 says leaving the environment. 6 Q And Claim 14 also says leaving the 7 environment, correct? 8 A Claim 7 -- Claim 14 states leaving the 9 environment. 10 Q So in your declaration, excuse me, 11 Paragraph 225, when you say: "The '140 12 application does not give an example of using the 13 user's location to determine that and to warn or 14 alert the user that the user is leaving the 15 virtual environment as recited in the claims." 16 Claim 14 and Claim 7 do not recite a 17 virtual environment, correct? 18 A They recite the environment which could 19 mean both the virtual or the physical environment, 20 but here what I'm saying is that the '140 21 application doesn't describe anywhere -- doesn't 22 recite or describe anywhere or give an example of

169 1 using the user's location to determine and to warn 2 or alert that the user is leaving the virtual 3 environment. 4 Q Let's look at the '140 application. 5 Great. You're back on Exhibit 3. Let's go to 6 page -- well, it's 119 on the bottom, yeah, 119, 7 great. Line 13 if you could go up a little bit. 8 Maybe I have that reference wrong. I apologize. 9 Let's go to the next page, Page 120 around 10 Line 13. 11 Okay. Do you see this paragraph that 12 starts at Line 13 with the words "consider an 13 example"? 14 A The I do. 15 Q Let's look at that. So that paragraph 16 says: "Consider an example in which Alice wears 17 ear phones," and so I have to move my -- "and 18 localize voice of Bob in front of her during a 19 phone call. While talking to Bob, Alice gets into 20 her car and begins to drive. The state where 21 Alice is located, however, prohibits drivers from 22 localizing sound while driving a motorized	171 1 physical environment and she's still in the 2 physical environment. She's in her car now. 3 Q How would Alice leave this physical 4 environment? 5 MR. HENRY: Objection to form. 6 BY THE WITNESS: 7 A Well, to leave a physical environment, you 8 would need to go to a different type of 9 environment. 10 So, an example of how Alice might change 11 her physical environment or leave her physical 12 environment would be, for example, to go into a 13 virtual environment. 14 BY MS. PIANA: 15 Q Would you leave a physical environment 16 without going into a virtual environment? 17 MR. HENRY: Objection to form, ambiguous. 18 BY THE WITNESS: 19 A Your question is would you leave a 20 physical environment if you're not going into a 21 virtual environment? 22 BY MS. PIANA:
170 1 vehicle. The earphones immediately stop 2 localizing the voice of Bob and switch the call 3 from providing Alice with binaural sound to 4 providing Alice with mono sound". 5 Do you see that? 6 A I do. 7 Q So what environment is Alice in at the 8 beginning of this example? 9 A At the beginning of this example and 10 throughout the example, Alice is in a physical 11 environment. 12 Q Okay. So Alice is in a physical 13 environment when she gets the phone call from Bob, 14 correct? 15 A That's right. 16 Q And Alice gets into her car and begins to 17 drive. 18 Do you see that? 19 A That's right. 20 Q Has Alice changed her physical 21 environment? 22 A No. She's still -- she started off in the	172 1 Q Yes. I'm trying to understand how you can 2 leave a physical environment. 3 A So, again, you can leave a physical 4 environment by going to a not physical 5 environment, such as a virtual environment. 6 Q Could you leave one physical environment 7 by going to a different physical environment? 8 A I would call that going into a different 9 area within the same environment, which is what I 10 think Alice did when she went into her car. 11 Q So after Alice gets into her car, what 12 happens with the audio as disclosed in this 13 paragraph here? 14 A So the paragraph the says: "The state 15 where Alice is located, however, prohibits drivers 16 from localizing sound while driving a motorized 17 vehicle. The ear phones immediately stop 18 localizing the voice of Bob and switch the call 19 from providing Alice with binaural sound to 20 providing Alice with mono sound." 21 So to answer your question, the sound, so 22 the ear phones stop localizing the voice of Bob

173 1 and switch the call from a binaural sound to a 2 mono sound. 3 Q When Alice is getting the binaural audio 4 from Bob in this example, is Alice in a 3D virtual 5 environment? 6 A She's not in a virtual -- she's not in a 7 3D virtual environment. 8 Q You testified earlier that a 3D virtual 9 environment could be an environment that just has 10 3D sound. 11 Do you remember that? 12 MR. HENRY: Objection to form. 13 BY THE WITNESS: 14 A What I said was that a virtual environment 15 or 3D virtual environment contains both 16 modalities, remember? I talked about the visual 17 modality and the sound modality. 18 BY MS. PIANA: 19 Q I remember you saying that it could have 20 both modalities, but it didn't have to have both 21 modalities. We could go back and look at your 22 testimony if that would be helpful.	175 1 virtual environment. 2 Q Let's look at -- could we go to -- we're 3 already there -- Page 96, great. 4 If you look down at the second paragraph 5 that starts around Line 11, could you read that 6 paragraph for us, please? 7 A Sure. "By way of introduction sound 8 localization (i.e. the act of relating attributes 9 of the sound being heard by the listener to the 10 location of an auditory event) provides the 11 listener with a three dimensional (3D) soundscape 12 or 3D sound environment where sounds can be 13 localized to points around the listener. Binaural 14 sound and some forms of stereo sound provide a 15 listener with the ability to localize sound, 16 though binaural sound generally provides a 17 listener with a superior ability to localize 18 sounds in the 3D environment". 19 Q So in your opinion as a person of skill in 20 the art, would a three-dimensional or 3D 21 soundscape be a 3D virtual environment? 22 A Not necessarily. A 3D soundscape can be
174 1 A Sure. I think the clarification that I 2 made is that a virtual environment would have the 3 visual and the sound modality. I could, of 4 course, close my eyes which is what I believe I 5 said, but the environment, the virtual environment 6 still contains those two modalities. 7 Q Let's go to Page 96 of this same exhibit, 8 which is Exhibit 3. And while we're doing that, 9 if you closed your eyes, Dr. Roginska, you would 10 be in an environment that only had 3D virtual 11 sound, correct, and not 3D virtual images, 12 correct? 13 MR. HENRY: Objection to form. 14 BY THE WITNESS: 15 A No. I mean the environment still has the 16 images as well as the sound. The images are still 17 there. 18 BY MS. PIANA: 19 Q But you as a user are not experiencing or 20 perceiving those images when your eyes are shut, 21 correct? 22 A Sure but the images are still there in the	176 1 in the real world, in the physical world as well 2 as in the virtual world. 3 Q Could a 3D, three-dimensional soundscape 4 be a 3D virtual environment? 5 A It could be in -- sure, it could be in a 6 virtual environment. It could be. 7 MS. PIANA: Let's go to another exhibit. 8 Let's go to Clement. That should be named as 9 Clement in our exhibit folder. 10 (A certain document was marked Roginska 11 Deposition Exhibit 4 for identification, 12 as of 02/27/2024.) 13 BY MS. PIANA: 14 Q Dr. Roginska, do you see the document 15 that's been labeled as Exhibit 4? 16 A Hold on a second, I'm downloading it so I 17 have a local copy. Give me a second. Okay, I'm 18 with you. 19 Q Let's go to Figure 3A in Clement. Okay. 20 Are you familiar with this figure, 21 Dr. Roginska? 22 A I am.

177 1 Q Can you describe for us what is happening 2 in Figure 3A specifically with the user who is 3 labeled A in this figure? 4 A So in Figure 3A we have a user that is -- 5 starts off in a what appears to be a virtual 6 environment, walks around to the three to four and 7 then appears to leave that environment. 8 Q In which point has the user left the 9 environment? 10 A When the user crosses from point four to 11 point five through a boundary. 12 Q Where is the boundary in Figure 3A? 13 A It's at point 310 -- location 310. 14 Q So the user A starts -- well, let me ask 15 you this and we can look at Clement if we need to 16 in more detail, but do you know what 320 is as 17 labeled in Figure 3A? 18 A Let me just double check. 19 So at position 4 the user has moved closer 20 to the boundary of the tracking -- it's the 21 tracking area. 22 Q So 320 which is that shaded region here in	179 1 Q Okay. Thank you. You've identified that 2 310 as shown here in Figure 3A is the tracking 3 device, correct? 4 A That's correct. 5 Q And 320 is the tracking area; is that 6 correct? 7 A That's correct. 8 Q Is 320 a physical environment? 9 A Well, 320 is a tracking area within a 10 physical environment, yeah. 11 Q So would 320 be a physical environment? 12 MR. HENRY: Objection to form. 13 BY THE WITNESS: 14 A 320 would be an area, a tracking area that 15 is represented in a virtual environment but the 16 space itself, where that boundary is where -- not 17 the boundary but where the boundary of the 18 tracking area is would be in the physical space. 19 BY MS. PIANA: 20 Q So is 320 a physical environment? 21 MR. HENRY: Objection to form, asked and 22 answered.
178 1 Figure 3A that is the tracking area in Clement; is 2 that right? 3 A That's correct. 4 Q What about 310, what is 310 in this 5 Figure 3A? 6 A So I'm referring -- I cover this in my 7 declaration in Paragraph 76 and this is taken from 8 Clement, if it is confirmed at block 153, which is 9 in a different figure, that the user is 10 approaching or nearing the boundary and is about 11 to enter an area where the tracking device 310 may 12 not be able to continue to track the user's 13 physical movement in the space 300, a transition 14 profile may be implemented at block 154 based on 15 various factors such as, for example, the virtual 16 environment, the real world space, 300, in which 17 the virtual environment is implemented direction 18 and/or speed and/or acceleration associated with 19 the movement of the user and other such factors. 20 Q Which paragraph was that from your 21 declaration? 22 A It was paragraph No. 76.	180 1 BY THE WITNESS: 2 A So 320 is, again, it's a tracking area so 3 it's an area within -- that is located in a space. 4 BY MS. PIANA: 5 Q Is it located in a physical space? 6 A Yeah, I suppose so, but 320 is a tracking 7 area and, yeah, that area would be in a space, a 8 physical space. 9 Q Is 320 a tracking area in a physical 10 environment? 11 A Well, 320 represents a tracking area, it 12 represents an area in a virtual space in this 13 figure. 14 Q What happens with the user as the user 15 proceeds from position 4 to position 5? 16 A So what happens from four to five is that 17 the -- again I will refer to my Paragraph 76, so 18 the user that is a location four in the virtual 19 space is approaching the boundary and is about to 20 enter an area where the tracking device 320 may 21 not be able to continue to track the user's 22 physical movement in the space 300. So there's a

181 1 transition profile that is being initiated. So 2 the user moves from the tracking area, moves 3 outside of the tracking area. 4 Q Okay. And then just for the record, the 5 tracking area is 320, correct? 6 A That's right. The tracking area is 320. 7 Q And what is 310? 8 A So 310 is is the tracking device. 9 Q So when the user moves from the tracking 10 area 320 outside the tracking area as in position 11 5, has the user left an environment? 12 A So in this example, I'm reading, that 13 user -- the user is approaching nearing the 14 boundary is about to enter an area where the 15 tracking device 310 may not be able to continue to 16 track the user's physical movement in space 300. 17 A transition profile may be implemented and based 18 on various factors such as for example the virtual 19 environment, the real world space 300 in which the 20 virtual environment is implemented direction 21 and/or speed and/or acceleration associated with 22 the movement.	183 1 tracking device 310 or other components of the 2 system determines that the user is positioned 3 within the preset threshold in this particular 4 example three feet of the boundary of the tracking 5 area 320 at position 3B, the system 100 may 6 initiate a gradual transition out of the virtual 7 world. At position 4 the user has moved closer to 8 the boundary of the tracking area 320, for 9 example, within one foot of the boundary as shown 10 it in the example and illustrated in Figure 3C, 11 which is just below the figure that you're 12 pointing to right now. 13 At position 4 the transition out of the 14 virtual world may be at least partially complete 15 within the transition process fully complete by 16 the time the user reaches position 5 and is fully 17 outside of the tracking area 320. 18 Q So as the user moves from position 4 to 19 position 5, has the user left an environment? 20 A That's correct, so the user as they're 21 moving from position 4 into position 5 goes 22 through here a process of transition but is
182 1 Q Where are you reading from, Dr. Roginska? 2 A Again, paragraph it No. 76 in my 3 declaration. 4 Q So when the user transitions from position 5 4 to position 5, has the user left an environment? 6 A So if I go just up one paragraph to 7 Paragraph 75, the situation is described in detail 8 by Clement here so I describe it here as -- so 9 Clement describes that the HMD 100 may include a 10 sensor that detects that the user's proximity to a 11 boundary of tracking area 320 or that the user is 12 within the threshold distance of a boundary of the 13 tracking area 320, the tracking device 310 may not 14 just track the physical position and movement of 15 user A in the space 300 but may also detect when 16 the user A is within a predetermined distance or 17 threshold of a boundary or edge of the tracking 18 area 320 where the system may issue a warning or 19 indicator and/or may automatically initiate a 20 fluid or graceful transition out of the virtual 21 world when the user approaches the boundary and I 22 continue to say that as the HMD 100 and/or the	184 1 transitioning from one environment to another 2 environment. 3 Q What environments is the user 4 transitioning from? 5 A The user in this case is transitioning 6 from a virtual environment. 7 Q What environment is the user transitioning 8 to? 9 A Transitioning to another environment so at 10 position 4, and I will quote again in 11 Paragraph 75, last sentence: "At position 4 the 12 transition out of the virtual world may be at 13 least partially complete within the transition 14 process fully complete by the time the user" -- 15 sorry, "user reaches position 5 and is fully 16 outside of the tracking area." 17 Q So what environment has the user 18 transitioned to in position 5? 19 A It has transitioned out of the virtual 20 environment and into an environment that is 21 outside of the 320 tracking area. 22 Q Is that environment that's outside the 320

185 1 tracking area a physical environment? 2 A It would have been obvious that that would 3 be a physical environment, yes. 4 Q What about the area that is inside 320 5 tracking area; is that also a physical 6 environment? 7 MR. HENRY: Objection to form. Asked and 8 answered. 9 BY THE WITNESS: 10 A So the 320 is a tracking area and the 11 tracking area that is represented as stated here 12 as a virtual world. 13 BY MS. PIANA: 14 Q Where would a user be experiencing what's 15 described in Figure 3A? 16 MR. HENRY: Objection to form, ambiguous, 17 calls for speculation. 18 BY THE WITNESS: 19 A Yeah, I'm not sure what you mean. Can you 20 be more specific, please? 21 BY MS. PIANA: 22 Q Sure. So in an example, there is --	187 1 Q As the user goes from position one to 2 position 2 to position 3, what does Clement say 3 about position 3? 4 A Can you point me to where that is in 5 Clement? 6 Q Sure. Let me pull that up. All right. 7 Let's look at column 4 around Line 49. 8 So do you see the paragraph that starts -- 9 oh, great -- as shown in Figure 3A the user A 10 immersed in the virtual world may move in the real 11 world space 300. 12 Do you see that? 13 A I do. 14 Q Figure 3A is the figure we were just 15 reviewing with Clement, right? 16 A That's right. 17 Q Clement discloses starting at Line 51: At 18 positions one, two, and three the user A is 19 completely within the field of view or tracking 20 area 320 of the tracking device 310. At position 21 3 the user A is within the tracking area 320 but 22 close to a boundary of the real world space 300
186 1 Clement discusses this, there is a physical space, 2 right? So 300 is marked as a physical space in 3 Clement; is that correct? 4 A I believe so. 5 Q So would one example of a physical space 6 be a living room? 7 A Sure. 8 Q So a user could set up the tracking device 9 which is 310 in the user's living room and also 10 set up the tracking area which is 320 in a user's 11 living room; is that correct? 12 A I suppose one could, yes. 13 Q So as the user moves from position one to 14 position 2 to position 3, that user is changing 15 its position within the tracking area, correct? 16 A They are changing their position within 17 the tracking area, yes. 18 Q And that user is also changing their 19 position in the living room of the user, correct? 20 A No. Here they are -- because they are in 21 the tracking area, they are what Clement refers to 22 as the virtual world.	188 1 such as for example a wall. 2 Do you see that? 3 A I do. 4 Q So Clement discloses physical movement of 5 the user within the tracking area; is that 6 correct? 7 A Yeah, I mean, Clement discloses that the 8 user is immersed in the virtual world and may move 9 in the real world space 300 and at positions one, 10 two, and three the user is completely within the 11 field of view or that tracking area 320 of the 12 tracking device No. 310 and at position about the 13 user A is within the tracking area 320 but it 14 close to a boundary of the real world space, the 15 real world space 300 such as for example a wall. 16 Q Let's go back to Figure 3A if we could. 17 So this space 300 is a real world space, 18 correct? That's what Clement says, right? 19 A That's right. 20 Q And so as the user is moving in their 21 living room, which is a real world space from 22 position one to two to three, then the user is

189 1 also moving within the tracked area 320, correct? 2 A That's correct. 3 Q On the lefthand side of Figure 3A do you 4 see how the tracked area goes up to that solid 5 line? 6 MR. HENRY: Objection to form. 7 BY THE WITNESS: 8 A Do you mean that upper left triangle? 9 BY MS. PIANA: 10 Q I mean the area just below the upper left 11 triangle, do you see where the shaded area goes to 12 this solid line here on the left? 13 A I do. 14 Q Maybe we can -- I don't know if we need to 15 mark it or not. We just saw from Clement that at 16 position 3, Clement says the user is getting close 17 to a wall. 18 Do you recall that? 19 A So I have -- yes, so Clement says at 20 position 3 the user A is within the tracking area 21 320 but close to a boundary of the real world 22 space 300.	191 1 Q And would that horizontal line represent a 2 boundary of the tracked area 320? 3 A That's what Clement says, that 320 is the 4 tracking area so that would indicate a boundary. 5 Q So when the user moves from position 4 to 6 position 5, the user has crossed this boundary at 7 the bottom of Figure 3A, correct? 8 MR. HENRY: Objection to form. 9 BY THE WITNESS: 10 A So as the user moves -- so I will read 11 again from Clement from the paragraph where we 12 were just at a moment ago, at position 4 the user 13 A is just within the tracking area 320, very close 14 to a boundary of the tracking area 320. At 15 position 5 the user has crossed the boundary of 16 the tracking area 320 and has moved completely out 17 of the field of view or tracking area 320 of the 18 tracking device 310. 19 BY MS. PIANA: 20 Q So Clement discloses that this boundary 21 here at the bottom of Figure 3A the horizontal 22 boundary that is between position 4 and position 5
190 1 Q Right. And if you keep reading the rest 2 of that sentence, please, Dr. Roginska? 3 A Yeah. But close to a boundary of the real 4 world space 300 such as, for example, a wall. 5 Q So Clement discloses that this solid line 6 on the lefthand side of Figure 3A that abuts the 7 shaded area could be a wall; is that right? 8 A That's what Clement says. 9 Q What about the boundary -- well, and you 10 would agree, Dr. Roginska, that a wall is a 11 physical boundary, correct? 12 A It is a physical boundary, yes. 13 Q What about the boundary that is horizontal 14 on the bottom of Figure 3A, do you see that that 15 boundary? 16 MR. HENRY: Objection to form. 17 BY THE WITNESS: 18 A Do you mean the one between position 4 and 19 five? 20 BY MS. PIANA: 21 Q Yes. That's the one I mean. 22 A I see a horizontal line, yes.	192 1 is a virtual boundary; is that correct? 2 A It is a -- well, it's a boundary between 3 the tracking area and being -- the tracking area 4 320 and being outside of the tracking area 320. 5 Q Could this boundary at the bottom of 6 Figure 3A between position 4 and position 5 be a 7 wall? 8 MR. HENRY: Objection to form, calls for 9 speculation. 10 BY THE WITNESS: 11 A You mean like a physical wall? 12 BY MS. PIANA: 13 Q Yes. I mean a physical wall. 14 A I don't think so. Because if a person -- 15 I mean, unless somebody can walk through walls but 16 a person wouldn't be able to walk from position 4 17 to position 5 if that horizontal line is a wall. 18 Q So would you agree, then, that this 19 boundary at the bottom of Figure 3A between 20 position 4 and position 5 is a virtual boundary? 21 MR. HENRY: Objection to form, asked and 22 answered.

193 1 BY THE WITNESS: 2 A Yeah. I don't know if I would call it a 3 virtual boundary but it's a boundary. 4 BY MS. PIANA: 5 Q But it's not a physical boundary, right? 6 It's not a physical wall, correct? 7 A It's not a physical wall. 8 Q How does Clement disclose determining the 9 position of the user while the user is in the 10 tracked area 320? 11 A So I covered that in my declaration. If 12 we go to in my declaration at Paragraph 75, thank 13 you. So in that paragraph I say: Clement 14 describes that the HMD 100 may include a sensor 15 that detects that the user user's proximity to a 16 boundary of the tracking area 320 or that the user 17 is within a threshold distance of a boundary of 18 the tracking area 320. The tracking device 310 19 may not just track the physical position and the 20 movement of the user A in the space 300 but may 21 also detect when the user A is within a 22 predetermined distance or threshold of a boundary	195 1 immersed. This base station may be, for example, 2 a standalone computing device or a computing 3 device included in the HMD worn by the user. 4 BY MS. PIANA: 5 Q So my question was what kind of sensors 6 does Clement disclose using? 7 A Here he discloses -- I want to make sure I 8 understand your question, by sensors do you mean 9 for the purpose of the tracking? 10 Q Yes. 11 A We just read and it's shown here that the 12 kind of sensors for motion tracking maybe it says, 13 for example, a camera positioned in the space in 14 communication with base stations or it also may be 15 a computing device included in the HMD worn by the 16 user. 17 Q Okay. So Clement says that the tracking 18 device might be a camera that's positioned in the 19 space and in communication with a base station, 20 correct? 21 MR. HENRY: Objection to form. 22 BY THE WITNESS:
194 1 or edge of the tracking area 320. 2 But I think the most relevant component 3 here to answer your question is that Clement 4 describes that the HMD 100 may include a sensor 5 that detects that the user's proximity to a 6 boundary of the tracking area 320. 7 Q What kind of sensors does Clement 8 disclose? 9 A Clement -- just give me one second. 10 MR. HENRY: Counsel, if you could look for 11 an opportunity to take a quick break soon that 12 would be appreciated. 13 MS. PIANA: Sure, let me just finish this 14 line of questioning and then we'll take a break. 15 BY THE WITNESS: 16 A So if we go to Clement, column 4, starting 17 at Line 15, please. Thank you I will so I'll read 18 in some embodiments this type of motion tracking 19 in the space may be accomplished by for example a 20 tracking device such as a camera positioned in the 21 space and in communication with a base station 22 generating the virtual world in which the user is	196 1 A That's what it says here in this 2 paragraph, yes. 3 BY MS. PIANA: 4 Q And then it says that the base station, 5 which is different than the camera, the base 6 station may be a standalone computing device or a 7 computing device included in the HMD worn by the 8 user, correct? 9 A That's correct. 10 Q And then it goes on to say: In the 11 example implementation shown it in Figure 3A, 12 that's the figure we were just looking at a 13 tracking device 310 such as, for example, a camera 14 310 is positioned in a physical real world space 15 300. 16 Do you see that? 17 A I do. 18 Q So Clement discloses that this tracking 19 device 310 is separate from the HMD worn by the 20 user, correct? 21 MR. HENRY: Objection to form. 22 BY THE WITNESS:

197 1 A Well, in that particular case, yes, but 2 there are other places in Clement that give 3 another example and just give me a moment to find 4 that. 5 BY MS. PIANA: 6 Q Okay? 7 A Another example I would like to point to 8 is also in Clement, column 6, around Line 27. 9 Thank you. I will read starting at Line 23. 10 As shown in Figure 3 C the user is 11 completely within the tracking area 320 at 12 position 3A. As the user moves from position 3A 13 to position 3B, the user approaches the point at 14 position 3B at which the edge of the established 15 three-foot radial zone meets the boundary of the 16 tracking area 320. As the HMD 100 and/or the 17 tracking device 310 or other component of the 18 system determines that the user is positioned 19 within the preset threshold, this particular 20 example three feet of the boundary of the tracking 21 area 320 as at position 3B, the system 100 may 22 initiate a gradual transition out of the virtual	199 1 of the sensing system 160 or by a microphone 2 included in the camera 180." 3 So this part of Clement that I just read 4 discloses several different types of sensors, 5 correct? 6 A Yes, it does. 7 Q So there's a light sensor 162, there's a 8 camera that may include a light sensor at 180, and 9 there is a microphone included in the camera at 10 180, there's also an audio sensor disclosed here, 11 right? 12 A Yeah, I see that. 13 Q So how could these types of sensors that 14 have been listed here in Clement determine when 15 the user is leaving the tracked area and not 16 encountering a physical wall? 17 A I'm sorry. Are you asking me how these 18 particular sensors detect the -- 19 Q Yes? 20 A Location of -- there are a number of 21 different sensors listed here, optical light 22 sensors, sound sensors, camera sensors, all of
198 1 world. 2 So here it clearly at Line 27 to 28 says 3 as the HMD 100 and/or the tracking device 310 or 4 other component of the system determines that the 5 user is positioned within the preset threshold. 6 So here is an example of how the HMD 7 and/or the tracking device is the device that 8 determines the position of the user. 9 Q So let's go to Clement Column 11. And 10 specifically around lines 52 to 57. So if you 11 see, Dr. Roginska, at Line 52, do you see where it 12 starts: "For example"? 13 A I see that. 14 Q So Clement discloses: "For example in 15 some embodiments a brightness level in the space 16 300", and that's the real world space, right, 300, 17 yes? 18 A Yes. 19 Q "May be sensed by a light sensor 162 of 20 the sensing system 160 or by a light sensor 21 included in the camera 180 and a sound level in 22 the space 300 may be sensed by an audio sensor 164	200 1 those sensors work in different ways, can work in 2 different ways to determine the position, the 3 location of a user, for example. 4 Q So how would a light sensor determine the 5 position of the user in the tracked area 320? 6 A So is your question -- are you asking me 7 how a light sensor works? 8 Q I'm asking how would a light sensor 9 determine the location of a user inside the 10 tracked area? 11 A I mean, a light sensor could be -- there 12 might be, I don't know, a light on the user who's 13 walking there and there's a light sensor that 14 detects a light on the user, that might be an 15 example of how a light sensor might do that. 16 Q Would those light sensors be on the HMD? 17 A I don't know. They could be. 18 Q So if the HMD -- sorry. Strike that. 19 If the user has a light and the user is 20 also wearing the HMD, how could a light sensor on 21 the HMD detect the location of the user inside the 22 tracked area?

201 1 A I want to make sure I understand. 2 So in this situation, this hypothetical 3 situation, you're saying that a user is wearing an 4 HMD and there's a light on the HMD and a light 5 sensor is detecting the location -- you're asking 6 me how does that light sensor sense the location 7 of the user? 8 Q Yes. 9 A Maybe if we look at this particular 10 situation with, you know, the light sensor and all 11 that, let me just go to the claim. 12 So I guess we're looking at Figure 1A; is 13 that right? 14 Q Yes, let's go to Figure 1A. 15 A Okay. Great. Thank you. All right. So 16 let's go through this. 17 Q So Figure 1A shows the HMD 100, correct? 18 A That's correct. 19 Q And so Figure 1A also discloses other 20 parts of the HMD, correct? 21 A Yes, it appears to, uh-huh. 22 Q So the sensors that we just discussed in	203 1 Actually Clement describes this just a 2 little bit lower in that paragraph that we were 3 on, and, I'm sorry, it's Column 11 around 4 Line 50 -- is that 57? And it states, I will 5 read: When transition is to be initiated the 6 brightness level and the sound level of the real 7 world space 300 sensed by the sensing system may 8 be compared to the brightness level and the sound 9 level of the virtual world by the processor 190 10 and the transition process, for example, the 11 transition profile may be selected/established 12 taking into account the degree of difference 13 between these environmental factors in the virtual 14 world and the real world. 15 Q So as a person of ordinary skill in the 16 art, what is that saying to you in terms of how 17 the sensor is located on the HMD can determine the 18 position of the user in the tracked area? 19 A Well, to be honest with you, the mechanics 20 of how the HMD and how the sensors figure out 21 where a person is located is not as important as 22 the fact that the HMD is determining the location
202 1 Column 11, those are all sensors that are present 2 on this illustration of the HMD in Figure 1A, 3 correct? 4 A Yes, that's correct. 5 Q So, sorry, Dr. Roginska, so we've got the 6 light sensor -- excuse me -- 162 and you can see 7 where that is on the HMD? 8 A Yes. 9 Q And then the -- let's see the camera 180 10 you can see where that is on the HMD? 11 A Yes. 12 Q Is it the audio sensor 164, that's also on 13 the HMD, correct? 14 A Correct. 15 Q Okay. So these sensors, again, are 16 present on the HMD and my question is how could 17 the system in Clement determine the location of 18 the user with these sensors? 19 MR. HENRY: Objection to form. 20 BY THE WITNESS: 21 A Well, that particular -- hold on, let me 22 just make sure I'm giving you a complete answer.	204 1 of the user. I'll tell you why. Because for a 2 person of ordinary skill, it would have been 3 obvious that an HMD -- based on Clement's 4 description a HMD can locate and track a user 5 within the space. 6 Q How would an HMD locate and track a user 7 in the space? 8 A I mean, as an example, it is described 9 here the paragraph that we just read. In this 10 case it might be using optical sensors or audio 11 sensors, there are gyroscopes, there is all sorts 12 of different kinds of sensors that might be 13 integrated into an HMD. 14 Q Right. But Clement says that these are 15 the types of sensors that could be present in the 16 HMD, correct? 17 A Clement says -- he says in some 18 embodiments, you know, this is an example, but I 19 think Clement's more important point is that the 20 HMD can determine the location of a user and can 21 track the user. 22 Q So how does Clement disclose the HMD

205 1 determining the location of the user at position 4 2 versus the location of the user at position 5? 3 A How does Clement's HMD, his specific HMD? 4 Q Yes. 5 A Well, he talks about comparing the -- in 6 that paragraph that I just read, he said that the 7 brightness level and the sound level of the real 8 world space 300 sensed by the sensing system may 9 be compared to the brightness level and sound 10 level of the virtual world by the processor, 11 et cetera, et cetera. So he gives an example of 12 how he might do this. But, again, I think that 13 the more important lesson that Clement teaches and 14 that he teaches through this patent is that the 15 HMD has the capability of locating a user and 16 tracking a user. 17 Q For the HMD to have the ability to locate 18 the user and track the user, does the HMD need an 19 external reference point? 20 MR. HENRY: Objection to form, ambiguous. 21 BY THE WITNESS: 22 A It might. I'm not -- I'm not sure.	207 1 take a break. 2 Q Yes. Thank you for reminding me. Okay. 3 Do you see around Line 31 it starts with. 4 "In another aspect"? Do you see that? 5 A I see that. 6 Q So Clement discloses here at Column 1, 7 lines 31: In another aspect, a method of 8 operating an audiovisual system configured to 9 generate a virtual immersive experience may 10 include, so Clement is laying out what this method 11 may include, activated a tracking device, having a 12 defined tracking area and tracking movement of a 13 user, I think maybe -- tracking movement of a user 14 electronic device in the real world space, I feel 15 there's a word missing there, as a person of skill 16 in the art, what is your understanding of a 17 tracking device? 18 MR. HENRY: Objection to form. 19 BY THE WITNESS: 20 A This to me means method of operating an 21 audiovisual system configured to generate a 22 virtual immersive experience includes activating a
206 1 BY MS. PIANA: 2 Q Would you consider yourself, Dr. Roginska, 3 to be an expert in the virtual reality game space? 4 MR. HENRY: Objection to form. 5 BY THE WITNESS: 6 A That's a huge space. I do consider myself 7 to be an expert with a lot of experience in the 8 virtual reality/augmented reality and gaming 9 space, but which particular area of that space are 10 you referring to? Am I an expert in building 11 HMDs, the hardware? Probably not. 12 BY MS. PIANA: 13 Q What about determining location in a 14 physical environment? Are you an expert in 15 different ways to determine location in a physical 16 environment? 17 A I would consider myself an expert in 18 determining the location in a physical 19 environment, yes. 20 Q Let's go to Clement at Column 1, 31 21 through 42. 22 A And after this question could we please	208 1 track device having a defined tracking area and 2 tracking movement of a user's electronic device in 3 the real world space so to me that means that I'm 4 activating, have a tracking area and I have a 5 tracking device in that area and I will have an 6 electronic device, I will track the movement of an 7 electronic device, of a user's electronic device. 8 Q So we looked at the tracking device in 9 Figure 3A. 10 Do you remember that? 11 A It wasn't the tracking -- it was the 12 movement of a user in Figure 3A, correct. 13 Q Let's go to Figure 3A. So we were looking 14 at the movement of a user but do you remember that 15 310 was the tracking device? 16 A Yes. 17 Q And 310 the tracking device is definitely 18 separate from the HMD worn by the user. 19 Do you agree with that? 20 MR. HENRY: Objection to form. 21 BY THE WITNESS: 22 A In that figure the HMD was not worn by the

209 1 user, that's right. 2 BY MS. PIANA: 3 Q Let's go back to Clement. Let's look 4 at -- let's look at column 4, Line 15. Do you see 5 the paragraph that starts in some embodiments, 6 this type of motion it tracking in this space may 7 be accomplished by, for example, a tracking device 8 such as a camera positioned in the space, do you 9 see that? 10 A Yes, I believe we read that part before as 11 well. 12 Q And so that portion of Clement discloses 13 the tracking device illustrated as 310 in 14 Figure 3A could be a camera, correct? 15 A It could be, uh-huh. 16 Q And that tracking device, again, is 17 separate from the HMD, correct? 18 MR. HENRY: Objection to form. 19 BY THE WITNESS: 20 A In that particular embodiment as Clement 21 says in some embodiments this type of motion 22 tracking could be accomplished by what you are	211 1 MS. PIANA: Good to my word, I will pause 2 there and we will take a break. 3 THE VIDEOGRAPHER: We are going off the 4 record at 3:34 p.m. Central time. 5 (A recess was had.) 6 THE VIDEOGRAPHER: We are going back on 7 the record at 3:48 p.m. Central time. 8 BY MS. PIANA: 9 Q Dr. Roginska, do you recall before the 10 break we were looking at Clement and specifically 11 column 4, right around Line 53 and you'd 12 acknowledged that Clement discloses at that column 13 and line the tracking device 310? 14 A I see the words written tracking device 15 310, yes. 16 Q So I show in Figure 3A Clement discloses 17 using this tracking device 310 to define the 18 tracking area 320 and also determine the user's 19 location within the tracking area 320; is that 20 correct? 21 MR. HENRY: Objection. Form, compound. 22 BY THE WITNESS:
210 1 reading, yes. 2 BY MS. PIANA: 3 Q Let's go now to 49 through 53, same 4 column, column 4. And I think we already looked 5 at this as well but starting at Line 49, it says: 6 As shown in Figure 3A, the user A, immersed in the 7 virtual world, may move in the real world space 8 300, for example, sequentially from position 1 to 9 position 5. 10 Do you recall that, Dr. Roginska? 11 A I do. 12 MR. HENRY: Counsel, it's been an hour and 13 a half now and we both requested a break so why 14 don't we go off the record and you can continue 15 your questioning once we get back. 16 MS. PIANA: One more question. 17 MR. HENRY: One more question? 18 MS. PIANA: Yes. 19 BY MS. PIANA: 20 Q At Line 53, do you see that Clement says 21 of the tracking device 310? 22 A I see those words written there, yes.	212 1 A At Clement Figure 3A, that's what the 2 figure -- the figure shows the tracking area 320 3 with a tracking device 310. 4 BY MS. PIANA: 5 Q How does Clement disclose determining the 6 user's position within the tracking area 320? 7 MR. HENRY: Objection to form. 8 BY THE WITNESS: 9 A Well, let's take a look. 10 So for that particular example, that 11 embodiment Figure 3A, Clement talks about in just 12 the paragraph above where you were showing so 13 column 4 starting at Line 15, in a whole paragraph 14 describes how this might be done. Would you like 15 me to read the paragraph? 16 Q No, thanks. You don't have to read the 17 paragraph. But maybe looking at that paragraph 18 you can answer my last question which is how does 19 Clement determine in the disclosure discussing 20 Figure 3A the position of the user within the 21 tracking area 320? 22 MR. HENRY: Objection to form.

213 1 BY THE WITNESS: 2 A So the location of the user, again, 3 Clement says starting at line around 29, in this 4 example, the tracking area 320 of the tracking 5 device 310 is smaller than the real world space 6 300 in which the system is received. As a user A, 7 immersed in the virtual world moves through the 8 real world space 300, a position of the user A in 9 the space 300 may be tracked by the tracking 10 device 310 and translated into a position movement 11 in the virtual world provided the user A remains 12 within the field of view or tracking area 320 or 13 tracking device 310. In this example the tracking 14 area at 320 is smaller than the real world space 15 300, it is possible for the user A to move out of 16 the tracking area 320 and still be in the space 17 300. The user if the user A moves out of the 18 tracking area 320 or for some other reason cannot 19 be seen by the tracking device 310, such as for 20 example being blocked by an obstacle and continued 21 movement of the user A in the real world space 320 22 will not be translated into corresponding movement	215 1 tracking device 310, so do you see the sentence 2 that says: As noted above while at position 4, 3 the tracking device 310 may still track movement 4 of the user A in the space 300. 5 Do you see that? 6 MR. HENRY: Objection to form, compound. 7 BY THE WITNESS: 8 A I see that sentence you just read, yes. 9 BY MS. PIANA: 10 Q In that sentence I just read, Clement is 11 disclosing using the tracking device 310 to 12 determine the position of the user inside the 13 tracking area, correct? 14 A That's correct. 15 Q And last part of this discussion on 16 Figure 3A, just a few lines down at Line 55, the 17 paragraph starting in some embodiments, do you see 18 that, Dr. Roginska? 19 A Yes, at Line 55 I do, yes. 20 Q So at Line 55, it says -- at Line 55 21 Clement discloses in some embodiments the tracking 22 device 310 may not just track the physical
214 1 in the virtual world, rather after tracking is 2 lost while the user A continues to move in the 3 real world space 300, the virtual world will 4 remain still or appear to be stuck. 5 So in this particular case the tracking 6 device 310 appears to be some sort of an 7 optical-based tracking device. 8 Q It's the tracking device 310 that 9 determines the position of the user A, correct? 10 I'll direct you to about Line 33 to 35? 11 A In this particular case, that's correct, 12 but in Clement, Clement states that as I pointed 13 to you before that the tracking device may be a 14 HMD, right, or a tracking device. 15 Q I understand. Let's go to Clement 16 Column 5, line 41 in the paragraph that starts as 17 noted above, so do you see that? 18 A I do. 19 Q And this disclosure in Clement is still 20 discussing Figure 3A which we already established 21 uses the tracking device 310, but I just wanted to 22 point out that it's still talking about using the	216 1 position and movement of the user A in the space 2 300 but may also detect when the user A is within 3 a predetermined distance or threshold of a 4 boundary or edge of the tracking area 320, at 5 which loss of tracking may be I am meant. 6 Do you see that? 7 A I see that, yes. 8 Q So, again, when discussing Figure 3A, 9 Clement discloses using the tracking device 310 to 10 determine the user's position within the tracking 11 area, correct? 12 A That's correct. 13 Q Are there any places in Clement that 14 disclose using only the HMD to track the user's 15 position in the tracked area? 16 A Yes, and I believe I pointed you to one 17 earlier but let me find that or another example. 18 Just give me one minute. 19 Another example, I can't remember if it's 20 the same one I pointed to you before but maybe 21 it's a different one because I know there's a 22 couple of places in the patent but let's look at

217 1 column 6, line -- around Line 27. And I just want 2 to zoom into the sentence that is very important 3 and I know this is still related to Figure 3, in 4 this particular example talking about 3C, it says: 5 "As the HMD 100 and/or the tracking device 310 or 6 other component of the system determines that the 7 user is positioned within the preset threshold, in 8 this particular example three feet of the boundary 9 of the tracking area 320, at position 3B, the 10 system 100 may initiate a gradual transition out 11 of the virtual world." 12 What's important here is the first part of 13 the sentence I just read which are states as the 14 HMD 100, which is the HMD that we looked at, 15 and/or the tracking device 310 and this indicates 16 that the tracking of the user's position could be 17 done by the HMD and/or the tracking device 310. 18 Q All of those other examples that we just 19 went through regarding Figure 3, Clement disclosed 20 using the tracking device 310 to track the user's 21 position, correct? 22 MR. HENRY: Objection to form.	219 1 HMD works? 2 Q Yes. Specifically how does the technology 3 within the HMD work to determine the user's 4 location? 5 A Yeah, but I mean he doesn't disclose how 6 the tracking device 310 works specifically. Go 7 ahead. 8 Q Sorry. That's not my question. 9 My question is does Clement disclose how 10 the HMD works to determine the user's location? 11 A Let me check. 12 So Clement does say that the -- I'm sorry, 13 I'm looking at Column 3, starting at line about 14 20, talks about the HMD 100 and all the sensing 15 system that it has. 16 Q So there at Column 3, Line 20, Clement 17 discloses: The HMD 100 may also include a sensing 18 system 160 including various sensing system 19 devices 162-164 and a control system 170 including 20 various control system devices 171-176 to 21 facilitate manual user control and automated 22 control of the HMD 100.
218 1 BY THE WITNESS: 2 A In the other examples that we read, he 3 focused on tracking device 310, but here he 4 clearly says that the tracking could have been 5 done either by the tracking device 310 or the HMD 6 100. 7 BY MS. PIANA: 8 Q How does Clement disclose using the HMD to 9 determine the user's position within the tracking 10 area? 11 A Well, Clement discloses that the HMD can 12 be used to determine the location -- 13 Q I understand -- I'm sorry. 14 MR. HENRY: Go ahead. 15 BY MS. PIANA: 16 Q I'm sorry. 17 A I was going to say that Clement discloses 18 that the HMD can be used to determine the 19 location. 20 Q But does Clement disclose how the HMD can 21 be used to determine the user's location? 22 A Do you mean how the technology within the	220 1 Is that what you were referring to, 2 Dr. Roginska? 3 A Yeah, that's right, and he goes on to 4 talking about in some embodiments the HMD 100 may 5 also include a camera, which may capture the 6 physical images, et cetera, et cetera and he also 7 then refers to in the following paragraph starting 8 at Line 42, there's a block diagram of a system 9 200 for transitioning from a virtual augmented 10 reality environment to an ambient environment 11 shown in Figure 2 and the system 200 may include a 12 user electronic device such as a HMD and described 13 above to generate the virtual environment system 14 in communication with a tracking system that 15 tracks a user position in the real world, physical 16 space so that the user's physical movement in the 17 real world space may be translated into movement 18 in the virtual reality world by the system 200. 19 So he talks about the HMD working in 20 combination with a tracking device to track the 21 user's position. 22 Q Does Clement disclose how the HMD by

221 1 itself can determine a user's position in the 2 tracked area 320? 3 MR. HENRY: Objection to form, asked and 4 answered. 5 BY THE WITNESS: 6 A Clement discloses that the tracking may be 7 done by a tracking device and/or the HMD 100 as we 8 went through the example a few minutes ago. 9 BY MS. PIANA: 10 Q Is that the most level of detail that 11 Clement discloses regarding how the HMD can be 12 used by itself to determine a user's position in 13 the tracking area 320? 14 MR. HENRY: Objection to form, ambiguous. 15 BY THE WITNESS: 16 A So Clement lists in a few locations and I 17 pointed to one, I can probably find others that I 18 know I found before, that the tracking can be done 19 by the HMD. He lists this in a number of 20 locations. He says that the tracking can be done 21 by the tracking device and/or the HMD so, I mean, 22 so it's obvious that Clement disclosed here that	223 1 the various sensors that could be included in the 2 HMD. 3 Do you recall that? 4 A Yes. 5 Q And Clement discloses that there could be 6 a camera 180 or there could be an audio sensor 164 7 as examples of the type of sensors that could be 8 in the HMD, correct? 9 A Sure. 10 Q How would a camera on the HMD know when 11 the user has left the tracking area 320? 12 MR. HENRY: Objection to form. 13 BY THE WITNESS: 14 A Are you asking specifically how the camera 15 180 would determine the location of the user? 16 BY MS. PIANA: 17 Q Sure. Let's start with that question. 18 How would the camera 180 which is on the 19 HMD determine the location of the user inside the 20 tracking area? 21 A Well, what Clement says here, gives an 22 example, for example, in some embodiments a
222 1 the tracking can be done by the HMD. 2 BY MS. PIANA: 3 Q And the tracking device that you just 4 mentioned, that's tracking device 310 which is 5 different from the HMD, correct? 6 MR. HENRY: Objection to form, 7 mischaracterizes testimony. 8 BY THE WITNESS: 9 A So what I said and again just going back 10 to column 6, I have not memorized it, okay, 11 Line 27, Clement says: "Clearly as the HMD and/or 12 the tracking device 310 or other component of the 13 system determines that the user is positioned 14 within the preset threshold," et cetera, 15 et cetera. 16 So Clement here clearly articulates that 17 the tracking can be done by the HMD or tracking 18 device 310 or he even says or other component of 19 the system. 20 BY MS. PIANA: 21 Q Let's go to Column 11, Line 57. So we 22 looked at this before, Dr. Roginska, in terms of	224 1 brightness level in the space 300 may be sensed by 2 a light sensor 162 of the sensing system 160 or by 3 a light sensor included in the camera 180 and a 4 sound level in the space 300 may be sensed by an 5 audio sensor 164 of the sensing system 160 or by a 6 microphone included in the camera. 7 So he talks about as an example, right, he 8 gives here an example of how this might work. 9 Q Let's go back to Figure 3A, please. 10 A Yes. 11 Q So if there is a camera on the WED -- 12 strike that. 13 If there is camera on the HMD on the 14 display and the user is moving from position 4 to 15 position 5, how would the camera know that the 16 eyes user has crossed that boundary at the bottom 17 of Figure 3A the horizontal boundary that we 18 previously established is not a physical wall? 19 A I think that the important thing here is 20 Clement describes an example of -- let me 21 rephrase. Let me start over. 22 Clement describes in multiple parts in

225 1 his -- in the document that the tracking can be 2 done, yes, by the tracking device 310, but he also 3 says that the tracking can be done by the HMD or 4 it another component of the system. And the 5 specific way of how this is done is maybe 6 secondary to this but what is important and what a 7 POSA would have focused on is that, okay, I have a 8 HMD, Clement disclosed that, I can track the 9 user's location by the HMD or in this case an 10 external tracking device but I can also do it on 11 the HMD. 12 Q Would a POSA know how to track a user's 13 position using a camera on the HMD when a user is 14 transitioning from position 4 to position 5? 15 A I can certainly think of, but I'm 16 speculating here so the tracker on the HMD with 17 the components that it has might figure out a way 18 how to determine the location based on the 19 relative location where it has started, right, so 20 you can -- as an example and this is not in 21 Clement, you can determine -- create a boundary 22 area and normalize your location to some location	227 1 MR. HENRY: Objection to form. 2 BY THE WITNESS: 3 A How specifically the technology works 4 within all the components in the HMD, that 5 specific description I don't think is here, 6 however, again, I want to underline the important 7 factor, that it is the -- he states that the HMD 8 can be used by itself as a tracking mechanism to 9 track the location of the user. 10 BY MS. PIANA: 11 Q You mentioned earlier determining relative 12 positioning, do you recall that? 13 A Just a few moments ago? 14 Q Yes. 15 A Yes. 16 Q And you also mentioned that you consider 17 yourself an expert in determining the physical 18 location in a VR environment; is that right? 19 A I have worked with a lot of different 20 tracking technologies and equipment of various 21 types so I have a lot of experience with tracking 22 technologies, yes.
226 1 within that boundary and use your relative 2 location by moving through that space, and that's 3 an example of how a POSA who thought you know 4 what, I can do this just through HMD, but, again, 5 the important idea that Clement set here is that 6 the tracking itself can be done by the HMD, and I 7 would like to just as I have the Clement up here, 8 I'd like to move your attention to column 12, 9 Line 20, here is another example where Clement 10 says: "In the absence of a specific command to 11 transition from the virtual world the HMD 100 12 and/or the tracking device 310 may determine a 13 current position of the user in the tracking area 14 320." 15 So here is another example of Clement 16 clearly states the HMD 100 and/or the tracking 17 device 310 may determine the current position of 18 the user. 19 Q I understand that Clement discloses that, 20 but Clement does not disclose how to determine 21 current position of the user using just the HMD, 22 correct?	228 1 Q How does determining relative positioning 2 work? What does relative positioning mean? 3 MR. HENRY: Objection to form. 4 BY THE WITNESS: 5 A Well, the example I gave before was just 6 an example -- a hypothetical example that one 7 could do it. And one could do it with in probably 8 various ways. As I said also before, would I be 9 building a tracker for you, no, that's not my 10 expertise. My expertise is in the field of 11 spacial audio. I have a lot of experience working 12 with tracking mechanisms because of that. So the 13 example that I gave was, yes, one could use for 14 example a relative location, not necessarily that 15 you would but, again, in this case I think what is 16 important in Clement is that he identifies that 17 the HMD, that the tracking or the tracking the 18 location of a user could be done either with a 19 tracking device which is an external device such 20 as the 310 or it could be done with the HMD 100. 21 BY MS. PIANA: 22 Q Does relative positioning require an

229 1 external device such as the tracking device 310? 2 A Here we are talking a hypothetical outside 3 of Clement, you're talking just a general question 4 whether any relative tracking device requires an 5 outside system? 6 Q Yes. 7 A So, no, relative tracking devices such as 8 ones using a gyroscope don't need to have an 9 external device. They could be self sufficient 10 let's call it. 11 Q What about if you were using a camera to 12 track position, would you need an external 13 reference point? 14 A If you are using a camera to track the 15 location of an object, most systems have a camera 16 that is an external camera, yes. 17 Q So back at Figure 3A, how would a camera 18 on the HMD determine when the user crosses that 19 boundary from position 4 to position 5? 20 MR. HENRY: Objection to form, asked and 21 answered. 22 BY THE WITNESS:	231 1 in Figure 3A is the tracking device which is not 2 the same as the HMD, correct? 3 MR. HENRY: Objection to form, 4 mischaracterizes testimony. 5 BY THE WITNESS: 6 A What we said was the HMD -- I'm sorry 7 tracking the user's position can be done by the 8 tracking device, for example, 310, but can also be 9 done by the HMD. 10 BY MS. PIANA: 11 Q Let's go to Column 11. I just want to 12 clarify one more point here. Down at Line 57 or 13 so, so we'd just been looking at this and the 14 lines above this section of Clement disclose the 15 various sensors that may be included on the HMD. 16 Do you recall that? 17 MR. HENRY: Objection to form. 18 BY THE WITNESS: 19 A I recall, yeah, us reading through the 20 different sensors that may be included on the HMD. 21 BY MS. PIANA: 22 Q All right. And when I'd asked you how
230 1 A I think Clement describes that in when 2 he's describing all the components and the -- you 3 read is earlier so nicely. 4 I believe that description is in Clement 5 column 4, that passage that we read earlier 6 starting at Line 15 that starts with in some 7 embodiments this type of motion tracking in the 8 space may be accomplished, for example, a tracking 9 device such as a camera positioned in the space 10 and in communication with a base station 11 generating the virtual world in which the user is 12 immersed. And he goes on to describe how that 13 device 310, so Figure 3A a tracking device 310 14 such as for example a camera 310 as positioned in 15 a physical real world space and is oriented to 16 capture a large portion of the space 300 as 17 possible with its field of view. 18 Q Right. But that camera referred to in 19 column 4 is not on the HMD, correct? 20 A That camera that we just read about, that 21 is -- for example, a camera 310, yeah. 22 Q And we had previously established that 310	232 1 Clement discloses using these sensors on the HMD 2 to determine the user's position in the tracking 3 area, you pointed me to this next sentence in 4 Clement that starts. "When the transition is to 5 be initiated", do you recall that? 6 A Vaguely. 7 Q This sentence in Clement, however, does 8 not disclose determining the user's position in 9 the tracking area, instead it discloses this 10 transition that the user experiences from leaving 11 the virtual environment; is that correct? 12 MR. HENRY: Objection to form. 13 BY THE WITNESS: 14 A So this states that when transition is to 15 be initiated, the brightness level and the sound 16 level of the real world space 300 sensed by the 17 sensing system may be compared to the brightness 18 level and sound level of the virtual world by the 19 processor 190 and the transition process, for 20 example, the transition profile may be selected, 21 established, taking into account the degree of 22 difference between these environmental factors in

233 1 the virtual world and the real world. 2 BY MS. PIANA: 3 Q Is that passage that you just read, 4 Dr. Roginska, say anything about how to determine 5 the user's location within the tracking area? 6 A This passage specifically talks about the 7 transition and how the transition is done, how it 8 is initiated and how it may be performed when 9 transitioning from the virtual world into the real 10 world. 11 Q So this passage that you just read does 12 not disclose how to determine a user's location 13 within the tracking area; is that correct? 14 A This particular passage that I read talks 15 about transition, does not talk about the -- 16 locating -- determining the user's location, 17 position. 18 Q Let's go back to the claims of the '179 19 patent, please, so that was Exhibit 2. And 20 specifically I'd like to go to limitation 1E and 21 we'll also talk about 7E and we'll also talk about 22 14E so let's start with 1E. So limitation 1E of	235 1 course, 1E as we've already established also 2 requires lowering the volume of the sounds. 3 So my question Dr. Roginska, is 1E 4 requires warning the user, 7E requires alerting 5 the user. As a POSA do those terms warning and 6 alerting mean different things to you? 7 MR. HENRY: Objection to form. Could you 8 break that up, Counsel? That was a whole page 9 and-a-half of a question. 10 MS. PIANA: Sure. I'm happy to. 11 BY MS. PIANA: 12 Q So 1E says warning the user, correct? 13 A Yes. 14 Q 7E says alerting the user, correct? 15 A Yes. 16 Q As a POSA, do those two phrases mean 17 something different? 18 MR. HENRY: Objection to form. 19 BY THE WITNESS: 20 A Well, a POSA would know that the word 21 alert and warn have slightly different meanings, 22 but that it would have been obvious that both
234 1 the '179 patent requires warning the user that the 2 user is leaving the 3D virtual environment by 3 filtering by the DSP the binaural sound to alter 4 the audio cues and it goes on. I won't spend a 5 lot of time reading it. We've spent a lot of time 6 on this limitation. 7 So 1E, the beginning of 1E requires 8 warning the user that the user is leaving the 3D 9 virtual environment, let's go now to 7E, please. 10 7E requires alerting the user that the 11 user is leaving the environment by altering the 12 processing of the binaural sound to degrade audio 13 cues in order to prevent the user from 14 experiencing external localization of the binaural 15 sound and we had talked earlier about the 16 difference between the word degrade -- the phrase 17 degrade audio cues in order to prevent the user 18 from experiencing external localization of the 19 binaural sound thus the phrase that's used in 7E 20 and the phrase that's used in 1E which is alter 21 audio cues to prevent the user from experiencing 22 external localization of the sounds and, of	236 1 alerting and warning means indicating to the user 2 that the user is leaving the environment. 3 Q What about the second part of 7E, by 4 altering processing of the binaural sound, is that 5 something different than filtering by the DSP the 6 binaural sound to alter audio cues? 7 A So I think we talked a lot about that 8 earlier, right, filtering by the DSP the binaural 9 sound, we talked about that, we would filter with 10 the DSP the binaural sound to alter, so to change 11 the cues to prevent the user from experiencing 12 this external localization. 13 And 7E states that altering processing of 14 the binaural sound to degrade the audio cues in 15 order to prevent the user from experiencing 16 external localization of the binaural sound. 17 Q So is filtering by the DSP different than 18 altering processing? 19 MR. HENRY: Objection to form. 20 BY THE WITNESS: 21 A Filtering by the DSP, I mean, filtering by 22 the DSP you mean the complete sentence, right,

237 1 filtering by the DSP the binaural sound to alter 2 cues to prevent the user from experiencing 3 external localization so we are altering the cues 4 so that the user cannot – we're changing the cues 5 in 1E so that the user could no longer experience 6 external localization. 7 BY MS. PIANA: 8 Q Is that the same thing you're doing in 7E? 9 MR. HENRY: Hold on a second. I think you 10 cut Dr. Roginska. 11 MS. PIANA: Oh, apologies. 12 BY THE WITNESS: 13 A No problem. 14 In 1E the binaural sound has its cue 15 altered to prevent external localization. Now, 16 altered means changed. In 7E altering the user -- 17 alerting the user that the user is leaving the 18 environment by altering processing of the binaural 19 sound to degrade the audio cues so 7E specifically 20 says you're altering the processing of the 21 binaural sound with the intention to degrade the 22 audio cues so that in order to prevent the user	239 1 says you're altering the processing of the 2 binaural sound to degrade the audio cues, you're 3 changing the processing. 4 So to a POSA, those two things would 5 really have been, you know, very similar or even 6 the same, you're doing some filtering with the DSP 7 to change the cues to degrade them so that the 8 user doesn't externalize -- doesn't locate 9 externally. 10 Q Let's go now to Claim 14 and we'll look at 11 14E. Which is the limitation that begins alerting 12 the user, do you see that, Dr. Roginska? 13 A I do. 14 Q And so limitation 14E is different than 1E 15 and 7E, limitation 14E says: "Alerting the user 16 that the user is leaving the environment by 17 reducing a volume of the binaural sound that 18 localizes from the virtual image and that is being 19 provided to the user." 20 Do you see that? 21 A I see that, yes. 22 Q If you reduce the volume of the binaural
238 1 from experiencing external localization. 2 Here the word that is I think important is 3 to degrade the audio cues whereas in 1E we're 4 talking about altering the audio cues but, you 5 know, to a POSA, it would probably be very 6 similar. I'm going to alter the cues. In 7E I am 7 degrading the cues. 8 Q I'm just trying to take this piece by 9 piece because I am not one of ordinary skill in 10 the art so I'm trying to understand but definitely 11 don't want you to think I'm trying to take things 12 out of context. 13 So what I'm trying to understand is is 14 filtering different than altering processing? 15 A Filtering means really processing, right, 16 so you're filtering, you're changing the sound in 17 some way. So filtering is usually a general term 18 that you're altering the sound in some way and in 19 1E that filtering means here in this case you're 20 altering the cues so you're doing the filtering to 21 alter the cues to prevent the user from 22 experiencing external localization. In 7E, it	240 1 sound, does that prevent the user from 2 experiencing external localization? 3 MR. HENRY: Objection to form. Incomplete 4 hypothetical. 5 BY THE WITNESS: 6 A So if you reduce a volume depending -- it 7 depends on how much the volume is reduced, but it 8 could so reducing a volume of the binaural sound 9 could impact the localization of the virtual 10 image. 11 BY MS. PIANA: 12 Q How much would you have to reduce the 13 volume to have an impact on the external 14 localization? 15 A You know, it depends on many factors. It 16 depends on things like what the sound is, the 17 content of the sound, how loud it is. It could 18 depend also on things like any kind of noise 19 that's in the environment. So those are just a 20 few examples. I can't give you an exact number, 21 but there are several factors that could impact by 22 how much does it have to be reduced.

241 1 Q How would a POSA determine whether the 2 volume has been sufficiently reduced to prevent 3 the user from experiencing external localization? 4 A How -- do you mean how they would measure 5 when external localization has been degraded or 6 how would they know that it could be degraded by 7 reducing the volume. 8 Q Let's do both of those. So let's do the 9 first one. 10 How would a POSA determine whether the 11 volume has been sufficiently reduced to prevent 12 the user from experiencing external localization 13 by measuring? 14 A I mean, a POSA can run -- so can ask 15 users, can run a test, for example, and say, all 16 right, here is your sound. I'm going to reduce 17 the volume. How do you perceive the spacial 18 saying, okay, I'm going to reduce it more, how do 19 you perceive the spacial saying, so that's one 20 example of a how a POSA can determine and it's 21 very common, my students do it all the time. 22 And what was the second part of that	243 1 sound. 2 So does Clement disclose binaural sound? 3 A I believe I covered that in my 4 declaration. Just give me a moment. I've 5 refreshed my memory. Thank you. 6 What was your question again? Can you 7 please repeat in. 8 Q Sure, does Clement disclose binaural 9 sound? 10 A Well, as I'm going to point to my 11 declaration in Paragraph 97, I'm just going to go 12 straight to the last sentence of that paragraph. 13 Q Okay. 14 A Thank you. So I'm just going it read the 15 last sentence of Paragraph 97, where I say: 16 Clement discloses an audiovisual system configured 17 to generate a virtual immersive experience, but 18 provides little detail about the audio processing. 19 Q So does Clement disclose binaural sound? 20 A So Clement does not disclose binaural 21 sound. 22 Q Does Clement disclose stereo sound?
242 1 question? 2 Q You had also mentioned that as opposed to 3 to measuring, how would a POSA know that the 4 external localization could be degraded by 5 reducing the volume? 6 A I mean, a POSA would know because that is 7 common knowledge that all the factors I mentioned 8 before could have an impact on -- so all the 9 factors I mentioned such as external noise and 10 what kind of sound it is could have an impact it. 11 This is why a POSA, I go back to my definition 12 that it's a person who would have an undergraduate 13 degree in computer science engineering or music 14 technology and two years experience because person 15 of that level of education and experience would 16 know these things. 17 Q Let's go back to your declaration -- I'm 18 sorry, let's go back to Clement. Clement was 19 Exhibit 4. Great. Thank you. 20 Okay. We've already spent a lot of time 21 talking about Clement but one of the aspects we 22 have not yet talked about with Clement is the	244 1 A I don't believe he talks about stereo 2 sound but just give me one moment. 3 No, Clement does not describe stereo or 4 talk about stereo sound. 5 Q Does Clement disclose mono sound? 6 A Clement does not disclose mono sound. 7 Q Does Clement disclose anything about the 8 location of the sound or where the sound is 9 perceived to come from? 10 MR. HENRY: Objection to form. 11 BY THE WITNESS: 12 A I don't believe Clement discloses the 13 location of sounds and where they're coming from. 14 BY MS. PIANA: 15 Q Does Clement say anything about a warning? 16 A Clement does talk about, remember, 17 alerting and -- hold on. Give me one second. I 18 want to make sure I answer your question fully. 19 Yeah, Clement talks about a warning. I 20 can point you to where he discusses providing a 21 warning. 22 Q Great.

245 1 A So in Clement if we go to Column 5, all 2 the way at the bottom, last two lines, so Line 66 3 and 67, so Clement says: For example the system 4 may issue a warning or indicator and/or may 5 automatically initiate a fluid or graceful 6 transition out of the virtual world when the user 7 is at position 4. 8 Q So what kind of a warning does Clement 9 disclose? 10 A I will point you to column No. 8, starting 11 at Line 14. Thank you. 12 "The warning indicator may include, for 13 example, a visual indicator and/or an audible 14 indicator and/or a physical indicator such as, for 15 example, a buzz or a vibration of the HMD 100. So 16 he talks about that the warning indicators, may be 17 visual, may be audio or may be physical. 18 Q The audio warning indicators in Clement 19 such as a buzz as disclosed here at Line 16 would 20 that be a binaural warning? 21 A It could be. 22 Q You had testified previously that Clement	247 1 A I think what I said -- I don't think I 2 said that. I think what I said was to any person 3 including a POSA alert and a warning are very, 4 very similar. There's maybe just a different 5 emphasis in warning and alert in the meaning of 6 the word, but I think a POSA would have recognized 7 that alert and a warning are very similar if not 8 the same. 9 BY MS. PIANA: 10 Q So is it your testimony now that an alert 11 and a warning are similar if not the same? 12 MR. HENRY: Objection to form. 13 BY THE WITNESS: 14 A I think that alert, again, alert and a 15 warning are very similar. The emphasis of the 16 meaning of whether it's alert and a warning could 17 be different and the meaning of those sounds can 18 be different, but they're very similar in 19 character. 20 BY MS. PIANA: 21 Q Sorry. What is very similar in character? 22 A Alert and a warning. I mean, the type of
246 1 doesn't disclose anything about binaural sound; is 2 that right? 3 MR. HENRY: Objection to form. 4 BY THE WITNESS: 5 A Well, Clement does not talk about 6 specifically binaural form but it would have been 7 obvious to a POSA who was working in this field 8 that an audio signal could be a binaural signal or 9 it could be a monaural signal or another type of 10 signal. 11 BY MS. PIANA: 12 Q What about an alert, does Clement describe 13 alert? 14 A I don't think he talks specifically about 15 an alert. He talks about the warnings we just 16 read. 17 Q You had testified earlier that a POSA 18 would consider a warning to be different than 19 alert, correct? 20 MR. HENRY: Objection to form, 21 mischaracterizes testimony. 22 BY THE WITNESS:	248 1 sound that alert is and the sound that the warning 2 is are very similar. Typically a warning has a 3 different meaning because it recognizes that maybe 4 such as here as Clement notes he talks 5 specifically about warnings, right, but alert, a 6 POSA would have known that an alert would have 7 been exactly the same thing. 8 Q Is this a POSA applying background 9 knowledge as of 2015 or a POSA applying background 10 knowledge as of 2019? 11 MR. HENRY: Objection to form. 12 BY THE WITNESS: 13 A This is a POSA who would have had the 14 education that we described with a bachelor's 15 degree in computer science, engineering or music 16 technology and that would have had two years of 17 experience in the industry or doing research. 18 BY MS. PIANA: 19 Q I understand but we'd established 20 previously that a POSA who has those 21 qualifications would have a different level of 22 background knowledge in 2015 versus a POSA who had

249 1 those same level of qualifications in 2019. 2 Do you recall that? 3 MR. HENRY: Objection to form, 4 mischaracterizes testimony, is asked and answered 5 probably 50 times. 6 BY THE WITNESS: 7 A So what we talked about is the definition 8 of POSA in my declaration and how I viewed the 9 experience and educational background of a POSA 10 when I considered these patents and when I wrote 11 my declaration. The field of warning, designing 12 warnings and alerts is a very, very long, long, 13 lapsing field and a person of any kind of skill of 14 ordinary -- a person of ordinary skill in this art 15 would know whether it was in 2015, 2010 or even 16 maybe before that a warning and an alert are very 17 similar in character and that in this case a 18 person who was reading Clement's patent and 19 description and reads warning would have known 20 that it was obvious that, yes, it could be a 21 warning, it could be alert. Both could be 22 presented.	251 1 THE VIDEOGRAPHER: We're going back on the 2 record at 5:04 p.m. Central time. 3 BY MS. PIANA: 4 Q Dr. Roginska, before we took our break, we 5 were talking about Clement. 6 Do you recall that? 7 A Yes. 8 Q And I would like to go back to Clement. 9 You'd previously testified that Clement does not 10 disclose binaural sound. 11 Do you recall that? 12 A Yes, I recall that. 13 Q So does the word binaural appear anywhere 14 in Clement? 15 A No. 16 Q So Clement does not disclose binaural 17 sound? 18 A Clement does not talk about binaural 19 sound. 20 Q We were talking about the warnings that 21 are disclosed in Clement. 22 Do you recall that?
250 1 BY MS. PIANA: 2 Q Do you consider yourself to be an expert 3 in the field of designing warnings and alerts? 4 MR. HENRY: Objection to form, ambiguous. 5 BY THE WITNESS: 6 A The field of warnings and alerts is a very 7 big field, and I have done a lot of work in the 8 field of auditory displays which part of auditory 9 displays are alerts and warnings. So I know quite 10 a bit about the field of auditory displays and 11 warnings. 12 MR. HENRY: Counsel, we've gone past an 13 hour again, and at the last break, Dr. Roginska 14 and I were of similar minds that we should take a 15 break closer than to an hour than an hour 16 and-a-half this time. So we'd appreciate it if we 17 could go off the record and you can continue your 18 questioning when we come back. 19 MS. PIANA: Okay. That's fine. 20 THE VIDEOGRAPHER: We are going off the 21 record at 4:53 p.m. Central time. 22 (A recess was had.)	252 1 A I do. 2 Q And we also were talking about the 3 difference between warning and alert but I don't 4 think we need to go over that anymore. 5 Let's look at your declaration at 6 Paragraph 172. And this sentence in your 7 declaration at Paragraph 172 says: "First as 8 discussed for element 14[e], Clement teaches 9 degrading the sound by reducing the volume". 10 Do you see that? 11 A I do. 12 Q Is it your position that reducing the 13 volume can degrade the sound? 14 A Clement teaches degrading the sound by 15 reducing the volume and it is my opinion that you 16 can degrade the sound by reducing its volume. 17 Q Let's go now to Sauk which is spelled 18 S-a-u-k. 19 MS. PIANA: Mr. Plummer, could you find 20 that in our exhibit folder, please. 21 (A certain document was marked Roginska 22 Deposition Exhibit 5 for identification,

253 1 as of 02/27/2024.) 2 BY MS. PIANA: 3 Q Dr. Roginska, do you recognize document 4 that has been marked as Exhibit 5? 5 A I do, and just give me one moment to 6 download it and open it. 7 Okay. I'm with you. 8 Q Great. Is Sauk directed to a virtual 9 reality game? 10 A Let me just get my head back to Sauk. One 11 moment. So I described Sauk in my declaration and 12 as Sauk pant titled: Method and Apparatus For 13 Creating a Multi-Dimensional Communication Space 14 For Use in a Binaural Audio System Describes that 15 while most development efforts in binaural audio 16 have been directed to simulating a virtual audio 17 environment, binaural audio may also be used as a 18 cue to provide the user with understandable 19 information regarding their surroundings. 20 So he specifically teaches that the audio 21 format, the dimension, and he talks about 22 binaural, talks about stereo and mono, may be used	255 1 about real live soldiers, not people playing a 2 game, correct? 3 A That's how I understand it. 4 Q All right. We've already looked at the 5 claims of the '179 patent and let's look at the 6 claims of the '184 patent, which we haven't yet 7 entered into as an exhibit. 8 MS. PIANA: Could you please pull up the 9 '184 patent from our exhibit folder. 10 (A certain document was marked Roginska 11 Deposition Exhibit 6 for identification, 12 as of 02/27/2024.) 13 BY MS. PIANA: 14 Q Let's go to the last two pages of this 15 exhibit and we'll look at these claims pretty 16 quickly. 17 Claim 1 is structured similarly to Claim 1 18 of the '179 and I'd like you to look at limitation 19 1D that starts warning the user. 20 Do you see that Dr. Roginska? 21 A Yes, I see that. 22 Q The '184 patent limitation 1E requires
254 1 to signify the importance of a sound. 2 Q So my question, Dr. Roginska, is does Sauk 3 disclose a virtual reality game? 4 A Does it talk about a virtual reality game? 5 Sauk in his patent does not specifically 6 talk about a virtual reality game. 7 Q Let's look at Sauk Column 10 around 8 Line 15. 9 Do you see at column 10, Line 15 Sauk 10 discloses: According to one aspect of the 11 invention the type 2 metadata specifies a group to 12 which the user of a particular BSS 400 has been 13 assigned for example the group could be a squad of 14 soldiers. 15 Do you see that? 16 A I see those sentences, yes. 17 Q If we go to Column 10, Line 44, Sauk 18 discloses an embodiment of the invention regarding 19 soldiers. 20 Do you see that? 21 A I see that. 22 Q So this embodiment of Sauk is talking	256 1 warning the user that the user is leaving the 3D 2 virtual environment by filtering by the DSP the 3 binaural sound by altering a spectral cue and 4 lower a volume of the sound playing to the user. 5 Do you see that? 6 A I do. 7 Q Let's go to Claim 7, please. And, again, 8 Claim 7, limitation D, is directed to alerting the 9 user that the user is leaving the environment by 10 altering processing of the sound by the DSP to 11 degrade a spacial cue and to lower the volume of 12 the sound playing to the user. 13 Do you see that? 14 A I do. 15 Q And the last one is Claim 14 of the '184 16 patent, can we look at that, please. Could we go 17 to Claim 14, please. And if you scroll up so we 18 can see the last part of Claim 14, great, the last 19 limitation of Claim 14 requires alerting the user 20 that the user is leaving the virtual image in the 21 environment, I'm not going to read the rest of it. 22 My point is each one of these claims that

257 1 we've just looked at in the '184 patent requires 2 an alert or a warning; is that right? 3 A That's correct. 4 Q And the claims in the '179 patent that we 5 have spent so much time discussing, those also 6 require an alert or a warning, is that right? 7 A That's correct. 8 Q So let's go back to Sauk which was 9 Exhibit 5, please. And in particular let's look 10 at column 12. Yes, right around Line 14 under the 11 subheading Alerts & Warnings. 12 Do you see that? 13 A I do. 14 Q If we scroll down under this subheading 15 Alerts & Warnings, let's look at what's disclosed 16 starting on Line 33. So starting at Line 33, Sauk 17 discloses: "The type 2 metadata can include GPS 18 coordinates of a sensor that detected a hazard or 19 an estimated GPS location of the hazard as 20 detected by the sensor. When this RF signal is 21 received by a user's radio, the user's BSS 400 22 will use the type 2 metadata to determine whether	259 1 be able to ascertain a direction of the sensor 401 2 and/or the associated hazard, cons subsequently 3 the user would know which direction to move away 4 from in order to escape the affected area. 5 Do you see that in Sauk? 6 A I do. 7 Q What kind of audio does Sauk because as a 8 warning here in this section? 9 MR. HENRY: Objection to form. 10 BY THE WITNESS: 11 A Be what kind of audio? 12 BY MS. PIANA: 13 Q Yes. 14 A The type of sounds that he describes as an 15 example, like earcons, is that what you mean? 16 Q I mean is it binaural audio? 17 A So in this case, Sauk discloses using 18 station audio to position a sound in an 19 environment. 20 Q And is spacial audio another way of saying 21 binaural audio? 22 A Yes.
258 1 the sensor 401 is relative to the user and provide 2 the user with an earcon as specified by the 3 enunciated data. The earcon would translate the 4 received enunciated data to a phrase like 5 "chemical toxin detected!", stay away, and would 6 be heard in a soldiers's 3D sound environment." 7 Do you see that disclosure in Sauk? 8 A I do. 9 Q So Sauk here expressly discloses that you 10 can have a 3D sound environment. 11 Do you see that? 12 A That's right. A soldier's 3D sound 13 environment. I see that. 14 Q And then moving on, in particular, the 15 sound environment manager 494 will use GPS 16 coordinates provided by the sensor 401 and GPS 17 coordinates provided of the user as provided by 18 the internal GPS generator 402 to determine the 19 direction of the hazard relative to the user, the 20 audible warning would thus alert the user it that 21 he is too close to the lethal toxin and by 22 listening to the 3D binaural audio the user would	260 1 Q As a POSA, why do you think Sauk uses 2 binaural audio for the warning as disclosed in 3 this section? 4 MR. HENRY: Objection to form. 5 BY THE WITNESS: 6 A Well, you know, Sauk talks about in an 7 earlier section so in the B section the context 8 for Sauk is there is what he calls the selective 9 relevance mode and this is described in Sauk just 10 next door here on Column 11 starting at Line 25. 11 BY MS. PIANA: 12 Q I understand. I would like to stick with 13 column 12 under the subsection heading Alerts & 14 Warnings because that's what we're talking about? 15 MR. HENRY: I'm not sure Dr. Roginska was 16 done answering. I think you cut her off. 17 BY THE WITNESS: 18 A I was hoping we could go -- I think it's 19 important to understand not just one section of 20 Sauk by the context of why Sauk is describing in 21 Section C the section about alerts and warnings. 22 So if we could go to Column 11 --

261 1 BY MS. PIANA: 2 Q Let me just finish my question around 3 column 12 and then we can go to Column 11? 4 MR. HENRY: She was responding to your 5 question, Counsel, and this is the second time 6 you've interrupted her in the middle of her answer 7 in just this colloquy. You've done it repeatedly 8 throughout the day. Let her answer fully before 9 you interrupt the witness. 10 Go ahead, Doctor. 11 MS. PIANA: Counsel, before we get to 12 Dr. Roginska, I have to point out that these types 13 of speaking objections are completely against the 14 rules under the PTAB proceedings and I would ask 15 you politely to refrain from making them in the 16 future. 17 MR. HENRY: I was just asking you not to 18 interrupt my witness. That's not even an 19 objection. This is just telling you don't 20 interrupt the witness as every questioning 21 attorney knows you let the witness answer the 22 question. So stop interrupting the witness.	263 1 example, in certain circumstances a user may not 2 want to eliminate all background audio 3 information, however, rather than keeping the less 4 relevant audio in the same audio dimension 5 whatever their desired binaural sound sources a 6 user could change the less relevant audio to a 7 monophonic 1D or stereophonic 2D dimension. The 8 effect of changing an audio format for sounds from 9 binaural to monophonic or it stereophonic audio 10 signifies a different level of relevancy or 11 importance for such audio. The process also 12 removes any localization cues for that audio. 13 Thus the level of the 1D, 2D, or 3D audio can be 14 adjusted to whatever the listener desires for that 15 dimension. 16 So it's important to note in this section 17 in Sauk because the selective relevance mode goes 18 directly to your question, Counsel, which is why 19 a -- why Sauk describes here using 3D sound and of 20 positioning the earcons in this example, he gives 21 the example of "chemical toxin detected!", why 22 using 3D sound would be important to heighten the
262 1 MS. PIANA: I will stop interrupting the 2 witness if you stop making these speaking 3 objections. You did not use the word objection 4 but you were clearly instructing her what to do. 5 MR. HENRY: I'm instructing you not to 6 interrupt the witness but I appreciate you saying 7 you will stop interrupting my witness. I'll make 8 the objections I'm going to make. 9 Dr. Roginska, please complete your 10 response. 11 BY THE WITNESS: 12 A Thank you. 13 So if we could go to Column 11 of Sauk, 14 starting at Line 25. Thank you. So Sauk 15 describes what he calls the selective relevance 16 mode, and the selective relevance mode talks about 17 and I will read a little bit, the selective 18 filtering techniques described above can be 19 utilized by the BSS or the binaural sound system 20 in another configuration which combines a 21 plurality of audio dimensions such as 3D, 22 binaural, 2D, stereophonic and 1D monophonic, for	264 1 relevance of that warning. 2 BY MS. PIANA: 3 Q So Sauk column 12 includes a subheading 4 titled Alerts & Warnings, correct? 5 A That's correct. 6 Q And the claims in the '179 and the '184 7 patents that we were talking about today are 8 directed to Alerts & Warnings; is that correct? 9 MR. HENRY: Objection to form. 10 BY THE WITNESS: 11 A The '179 and '184 patent described using 12 warnings and alerts. 13 BY MS. PIANA: 14 Q Okay. The section of Sauk that you were 15 just looking at, Dr. Roginska, is under a separate 16 heading, right? 17 A I'm sorry, which section are you referring 18 to right now? 19 Q The section starting in Column 11 that I 20 were just referring to, Dr. Roginska, that is 21 under a separate subheading; is that correct? 22 A That's -- it's a separate heading from the

265 1 heading of the Alerts & Warnings, yes. 2 Q Right. Under the Alerts & Warnings 3 subheading, what type of alert or warning does 4 Sauk disclose? 5 A Well, here he specifically talks about -- 6 I'll read the audible warning would thus alert the 7 user that he's too close to the lethal toxin and 8 by listening to the 3D binaural audio the user 9 would be able to ascertain a direction of the 10 sensor. So he is talking about here specifically 11 about 3D binaural audio in that example. 12 Q Does Sauk disclose using any other type of 13 audio for alert or warning? 14 A In the example I think he gives in that 15 section and he does list them as an example and 16 I'm going to just redirect you to column 12, line 17 starting at 17, so he says or starting at 15 18 really: "In addition to voice communication, 19 other types of information can be superimposed 20 into the sound field using type 1 and type 2 21 metadata. For example, sensor information can be 22 detected by using one or more sensors. And the	267 1 A Yes. I would say that's fair. 2 Q Does Sauk disclose under this Alerts & 3 Warnings section lowering the volume of a warning? 4 A In Section C specifically under the Alerts 5 & Warnings, Sauk I don't believe talks about 6 lowering the volume. 7 Q And, in fact, what Sauk discloses under 8 Section C is that the phrase, this is at Line 40, 9 if you could move down a little bit in the Zoom, 10 please, thank you. At Line 39 the earcon would 11 translate the received enunciated data to a phrase 12 like "chemical toxin detected, stay away!" with an 13 exclamation point at the end. 14 Do you see that? 15 A I see that. 16 Q As a POSA would you interpret the use of 17 the exclamation point at the end of the warning 18 disclosed here in Sauk mean that the volume would 19 be lowered? 20 MR. HENRY: Objection to form. 21 BY THE WITNESS: 22 A I don't think I would relate the
266 1 sensor information can be integrated into a format 2 corresponding -- into a format corresponding to 3 signal. This signal is then transmitted to 4 various users and received using a BSS 400 5 associated with each user." 6 So in this particular example that he 7 lists, he talks about using the BSS, which is the 8 binaural sound system, to render the sounds. 9 Q So under this section in Sauk, subtitled 10 Alerts & Warnings, the only type of alert or 11 warning that is disclosed is binaural; is that 12 correct? 13 MR. HENRY: Objection to form. 14 BY THE WITNESS: 15 A In the examples that are given under 16 Section C, the examples talk about the 3D sound 17 binaural sound. 18 BY MS. PIANA: 19 Q And the reason for using 3D binaural under 20 this Alerts & Warnings is so the soldier can 21 detect the location of the hazard; is that 22 correct?	268 1 exclamation point to the volume being increased or 2 decreased. 3 BY MS. PIANA: 4 Q So you think that a warning regarding the 5 location of a chemical toxin could be at a 6 decreased volume? 7 MR. HENRY: Objection to form. 8 BY THE WITNESS: 9 A I'm sorry. Could you say that again? 10 BY MS. PIANA: 11 Q Sure. Would you as a POSA think that a 12 warning regarding the location of a chemical toxin 13 would be decreased? 14 MR. HENRY: Objection to form, ambiguous. 15 BY THE WITNESS: 16 A I mean, as a POSA I don't -- I wouldn't -- 17 I mean, from reading this or even thinking about 18 the volume of a warning based on this specific 19 warning, I don't -- I don't think I would think 20 whether that warning would be decreased in volume 21 or increased in volume. I don't think there's 22 anything here that as you said points to

269 1 decreasing or increasing the volume. 2 BY MS. PIANA: 3 Q What do you think is the significance of 4 the exclamation point used in Line 41? 5 MR. HENRY: Objection to form. 6 BY THE WITNESS: 7 A This is a phrase. It could mean inflexion 8 of the words. 9 BY MS. PIANA: 10 Q Let's go back to your declaration, 11 Paragraph 112. Let's look at this last sentence, 12 well, actually the last two sentences. So a POSA 13 would understand that because users are able to 14 perceive changes in audio dimension incorporating 15 a change in audio dimension to the binaural audio 16 warning of Clement and Osman would enhance the 17 user's ability of the user to perceive the 18 warning. A POSA would have been motivated to make 19 this change in order to enhance the effectiveness 20 of the warning to ensure the warning would be 21 heeded by the user. 22 Do you see that?	271 1 A In situations such as, for example, the 2 one that we just read in Sauk where you have a 3 soldier and there's a chemical something and you 4 want to make sure that the user here's a warning 5 and you want to enhance the effectiveness of the 6 warning, in addition to, it for example, we talked 7 about in Clement as you leave the environment 8 you're fading out the sound, warning the user that 9 they're leaving the environment, in addition to 10 that, as a way to enhance and to make sure that 11 the user is hearing the warning, a POSA would be 12 motivated to change the dimension of the sound so 13 that the user hears the warning for sure. 14 Q So back as we were talking about in Sauk, 15 you've got a soldier who is being warned about a 16 chemical toxin. 17 Do you recall that? 18 A I do. 19 Q So to ensure that that soldier would heed 20 the warning, would you reduce the volume? 21 A Reduce the volume of what? 22 Q Of the warning.
270 1 A I see that. 2 Q What is the change that you are referring 3 to in that last sentence in Paragraph 112? 4 A The change that I'm referring to is 5 described -- the sentence before as you read: A 6 POSA would understand that because users are able 7 to perceive changes in audio dimension 8 incorporating a change in audio dimension in the 9 binaural audio warning of Clement and Osman would 10 enhance the user's ability of the user to perceive 11 the warning. 12 So when I say a POSA would have been 13 motivated to make this change, I'm referring to 14 the change in the audio dimension. 15 Q All right. And the last sentence you say 16 that that would enhance the effectiveness of the 17 warning to ensure the warning would be heeded by 18 the user. 19 Why is it important -- sorry, I didn't 20 mean to talk over you. 21 Why is it important for a user to heed a 22 warning?	272 1 A But that's not what Sauk talks about here. 2 He's talking about changing the dimension. 3 Q I understand. But back on Sauk, we can go 4 back to Sauk if you don't mind, please, that's 5 Exhibit 5. All right. So here we are again Sauk 6 column 12, the earcon would translate the received 7 enunciated data to a phrase like "chemical toxin 8 detected, stay away!", that's the warning that is 9 disclosed in this section of Sauk, correct? 10 A That's correct. 11 Q So here with the chemical toxin to the 12 soldier, would you reduce the volume of the 13 warning? 14 MR. HENRY: Objection to form. 15 BY THE WITNESS: 16 A I wouldn't reduce the volume. 17 BY MS. PIANA: 18 Q And here in Sauk we also discussed how the 19 warning is given in binaural sound so the user can 20 know I'm quoting here it from Line 50, which 21 direction to move away from in order to escape the 22 affected area, correct?

273 1 A That's right. 2 Q Let's go back over to Column 11 in Sauk 3 under the selective relevance mode. 4 How does Sauk disclose switching from 3D 5 to 2D to 1D audio? 6 A So in the selective relevance mode 7 section, Sauk describes the different dimensions 8 as we talked about before, 3D binaural, 2D 9 stereophonic, 1D monophonic. And in the next 10 paragraph, he describes in order to implement the 11 foregoing effects separate binaural audio 12 environments can be defined for each predetermined 13 group of users thereafter each BSS 400 can use 14 received metadata to determine a group of a user 15 from which enunciated data originated. Enunciated 16 data received from various users within the user's 17 predetermined group will be presented in a 18 binaural format. In particular the sound 19 environment manager 494 will use the type 1 20 metadata 604-1 to determine if a signal originated 21 with a member of particular group. Enunciated 22 data originating from members of the same group	275 1 the voices of members of their own group." 2 So here he describes how the switch might 3 happen. 4 Q So in particular I'd like to draw your 5 attention to Column 11, Line 64, the sentence that 6 starts: For example, rather than reproducing such 7 audio in 3D binaural format, the audio can be 8 presented in 1D monophonic format. 9 So Sauk discloses reproducing audio from a 10 1D format to a 3D binaural format? 11 A Sauk describes, yes, so switching from a 12 3D to a 1D format in this case as an example. 13 Q And that switching involves reproducing 14 that audio; is that correct? 15 A What do you mean by reproducing? 16 Q As a POSA what do you think Sauk means by 17 reproducing? 18 A Rather than reproducing meaning playing 19 the audio in a 3D binaural format, the audio can 20 be presented in a 1D monophonic format meaning 21 that the sound instead of being filtered and 22 processed to be played and reproduced in binaural
274 1 will be reproduced for a user of each BSS 400 in a 2 3D binaural audio environment each BSS four can 3 process enunciated data for group members using 4 type 2 metadata to create binaural audio to 5 represent where members of that user's group are 6 located. 7 Then he continues: "According to a 8 preferred embodiment, the BSS 400 will also 9 receive RF signal 600 from users associated with 10 at least a second one of the predetermined groups 11 of users. Such RF signals can be identified based 12 by using type 1 metadata. The enunciated data 602 13 from these signals is also reproduced at headset 14 108 and can be audibly perceived by the user. 15 Significantly, however, BSS 400 can be configured 16 to reproduce such audio in a different audio, 17 format, for example, rather than reproducing such 18 audio in a 3D binaural format, the audio can be 19 represented in 1D monophonic format. Because this 20 audio is not presented with the same audio effect, 21 it is perceived differently by a user. The user 22 can use this distinction to selectively focus on	276 1 format can be processed to be reproduced in a 2 monophonic format. 3 MS. PIANA: We are at a pretty good 4 stopping point right now. Why don't we take a 5 break and come back on the record after about 10 6 minutes. 7 MR. HENRY: Okay. 8 THE VIDEOGRAPHER: We're going off the 9 record at 5:44 p.m. Central time. 10 (A recess was had.) 11 THE VIDEOGRAPHER: We're going back on the 12 record at 6:00 p.m. central time. 13 BY MS. PIANA: 14 Q Dr. Roginska, I'd like to go back to the 15 '140 application which is Exhibit 3. And in 16 particular I would like to go to the PDF Page 120. 17 Yes, right there, great. 18 So here at Line 22, the end of Line 22, it 19 starts. As another example when Alice enters the 20 car, a system in the car pairs with the HPED and 21 automatically switches the call from binaural to 22 mono.

277 1 Do you see that? 2 A I see that. 3 Q So when Alice is outside of the car, Alice 4 is in a physical space, correct? 5 A Let me just get my head back to this 6 example that we were on before. If you don't mind 7 I'd like to just read from Line 20 so I'm back in 8 that example. 9 Q Okay. 10 A Yes, thank you. I've read it. 11 Q When Alice is outside of her car, she is 12 it in a physical space; is that correct? 13 A Yes. 14 Q And then Alice enters her car, that's at 15 Line 23, and that would be in a different physical 16 space; is that correct? 17 A Yes. 18 Q And so the transition that Alice makes 19 from one physical space outside of her car to a 20 different physical space inside her car triggers 21 her audio to change from binaural to mono; do you 22 see that?	279 1 A When you say the word environment, it's a 2 change in the processing, it's a change in the 3 dimension, the type of sound so from binaurals we 4 discussed before to mono is a different way of 5 processing the sound. 6 BY MS. PIANA: 7 Q So it is a change in the sound, correct? 8 A It says here that yeah, it's a change from 9 binaural to mono, so it's a change from binaural 10 sound to mono sound. 11 Q Let's go to Page 96, that's the PDF page 12 number of this same exhibit if you look around 13 Line 11, I'll let you read that whole paragraph 14 there starting by way of introduction? 15 A Yes, I have read it. 16 Q So at Line 13, and this is the '140 17 application, it describes a three-dimensional 18 soundscape or 3D sound environment where sounds 19 can be localized to points around the listener. 20 Do you see that? 21 A I see that. 22 Q So let's stay here on this page but I want
278 1 A I see that, yes. 2 Q So that change in her audio from binaural 3 to mono is that a change in her 3D soundscape 4 environment? 5 MR. HENRY: Objection to form. 6 BY THE WITNESS: 7 A Well, that change from when it 8 automatically switches the call from binaural to 9 mono is a change in -- the processing is a change 10 in what Sauk referred to as the dimension of the 11 sound, of the audio. 12 BY MS. PIANA: 13 Q What triggers that change in this example? 14 A So this example, what triggers the change 15 is when Alice enters the car. 16 Q And is that change a change in her audio 17 environment? 18 A I'm sorry. Can you repeat that? 19 Q Sure. Is that change from binaural to 20 mono is that a change in her audio environment? 21 MR. HENRY: Objection to form. 22 BY THE WITNESS:	280 1 to talk more about Alice. 2 So when Alice is outside of the car, she 3 is getting binaural audio. 4 Do you recall that from the example we 5 were just discussing? 6 A I do. 7 Q So when Alice is getting binaural audio, 8 is she in a 3D sound environment? 9 A Well, the environment that Alice is in 10 when she's outside the car is in the physical 11 environment so she is in an environment and she's 12 hearing through her headphones I believe 3D sound. 13 Q And then when she gets in the car, she is 14 no longer hearing 3D sound; is that correct? 15 A That's right. When she went from outside 16 the car to inside the car, her sound switched I 17 believe from binaural to mono. 18 Q So when she is inside the car she's in an 19 environment where she is no longer receiving 3D 20 sound; is that correct? 21 A That's what the example stated. 22 Q Let's now go back to your declaration and

281 1 in particular I would like to turn to Page 55. 2 This is around Paragraph 91. And so here in 3 Paragraph 91 you've got a table that lists the 4 '179 patent and further down it lists the '184 5 patent and the various grounds that are being 6 asserted in these IPR cases. 7 Do you see that? 8 MR. HENRY: Objection to form. 9 BY THE WITNESS: 10 A Yeah, I see the table with the patents 11 listed, the grounds, the relevant prior art and 12 the claims for each patent and each ground. 13 BY MS. PIANA: 14 Q You don't have any opinions on 15 combinations other than what's listed in this 16 table here, correct? 17 MR. HENRY: Objection to form, 18 mischaracterizes the document. 19 BY THE WITNESS: 20 A I list my opinions in the document and 21 describe them separately in the document. 22 BY MS. PIANA:	283 1 (A certain document was marked Roginska 2 Deposition Exhibit 7 for identification, 3 as of 02/27/2024.) 4 BY MS. PIANA: 5 Q Dr. Roginska, do you recognize the 6 document that has been be marked as Exhibit 7? 7 A I do. 8 Q Could you identify this document for us, 9 please? 10 A It is my declaration for the '836 patent. 11 Q Regarding the '836 patent, you don't have 12 any opinions on combinations other than what's 13 listed in this document; is that correct? 14 A That's correct. 15 Q So all of your opinions regarding the '836 16 patent are contained within this declaration; is 17 that correct? 18 A That's correct. 19 MS. PIANA: At this point I have no 20 further questions for the witness. 21 MR. HENRY: Great. I have a few 22 questions.
282 1 Q But those opinions and combinations are 2 all contained within your declaration document, 3 correct? 4 A Yeah, my entire declaration document, yes. 5 Q So all of your opinions regarding the '179 6 patent and the '184 patent are contained within 7 this declaration; is that correct? 8 A That's correct. 9 MS. PIANA: At this point, let's take 10 another break. 11 MR. HENRY: Off the record, please. 12 THE VIDEOGRAPHER: We are going off the 13 record at 6:10 p.m. Central time. 14 (A recess was had.) 15 THE VIDEOGRAPHER: We're going back on the 16 record at 6:17 p.m. Central time. 17 BY MS. PIANA: 18 Q Dr. Roginska, let's move on to the '836 19 patent. 20 MS. PIANA: So Mr. Plummer could you find 21 the declaration in the folder entitled Roginska 22 '836 declaration.	284 1 EXAMINATION 2 BY MR. HENRY: 3 Q Dr. Roginska, could you pull up Clement 4 again, please. 5 AV TECH PLUMMER: One moment. 6 BY MR. HENRY: 7 Q Let me know when you have it. 8 A I have it. 9 Q Okay. Let's go look at Column 3, lines 10 beginning at Line 42 and let me know when you're 11 there. 12 A Line 42? 13 Q Yes. Are you there? 14 A I'm there. 15 Q Do you remember discussing with opposing 16 counsel whether the HMD in Clement could determine 17 the location of a user? 18 A I do. 19 Q Do you see in Column 3 where Clement 20 discloses a system for transitioning from a 21 virtual or augmented reality environment to an 22 ambient environment?

285 1 A I see is that. 2 Q It goes on to say the system 200 may 3 include a user electronic device 250, right? 4 A That's right. 5 Q For example an electronic device 250 can 6 be a HMD, right? 7 A Right. 8 Q And then if you go down to Line 51, you 9 see where it tells you that electronic device 250 10 may include a sensing system 260 and a control 11 system 270, right? 12 A Yes. 13 Q And then in lines 55 to 57 what components 14 of that electronic device with its sensing system 15 are disclosed? 16 A So in the example embodiment shown in 17 Figure 2 the sensing system 260 includes a light 18 sensor 262, a distance/proximity sensor 263, and 19 an audio sensor 264 and the control system 270 20 includes a power control device 271. 21 Q So those are sensors that Clement 22 discloses can be in its HMD?	287 1 determinations? 2 A That's correct. 3 Q Now, Dr. Roginska, at the end of 4 questioning from 8K's counsel you were asked about 5 the declaration you submitted that related to the 6 '836 patent, right? 7 A Yes, that's correct. 8 Q Other than those questions, Counsel for 8K 9 did not ask you any questions about any of the 10 substance of your opinions relating to the '836 11 patent today, right? 12 MS. PIANA: Objection. Form. 13 BY THE WITNESS: 14 A That's correct. 15 BY MR. HENRY: 16 Q You were prepared to answer such questions 17 today? 18 MS. PIANA: Objection. Form. Sorry. 19 BY THE WITNESS: 20 A Yes, I was. 21 MR. HENRY: I have no further questions. 22 Anything else?
286 1 A That's correct. 2 Q Let's look down at column 7 now and 3 Line 7. Let me know when you're there. 4 A I'm there. 5 Q Do you see here that Clement discloses 6 that the HMD 100 may include a sensor that detects 7 the user user's proximity to a boundary of the 8 tracking area 320? 9 MS. PIANA: Objection. Form. 10 BY THE WITNESS: 11 A I see that's what it says, yes. 12 BY MR. HENRY: 13 Q So this is another example where Clement 14 discloses that the HMD can detect the user's 15 location in proximity to a boundary, right? 16 MS. PIANA: Objection. Form. 17 BY THE WITNESS: 18 A That's correct. 19 BY MR. HENRY: 20 Q And then do you see in Line 12 of 21 column 7, where, again, Clement discloses that its 22 HMD can have a proximity sensor to make these	288 1 MS. PIANA: Yes. Just a few more 2 questions. 3 FURTHER EXAMINATION 4 BY MS. PIANA: 5 Q Let's go back and look at -- 6 MS. PIANA: Let's take a break. 7 THE VIDEOGRAPHER: We're going off the 8 record at 6:24 p.m. Central time. 9 (A recess was had.) 10 THE VIDEOGRAPHER: We're going back on the 11 record at 6:29 p.m. Central time. 12 BY MS. PIANA: 13 Q Okay, Dr. Roginska, just a few questions 14 about Clement. 15 MS. PIANA: So let's pull Clement back up, 16 please, and let's look at Column 3, Line 42. 17 BY THE WITNESS: 18 A Uh-huh. 19 BY MS. PIANA: 20 Q And do you see that the first sentence of 21 this paragraph is: A block diagram of a system 22 200 for transitioning from a virtual/augmented

289 1 reality environment to an ambient environment is 2 shown in Figure 2. 3 Do you see that? 4 MR. HENRY: Objection to form. 5 BY THE WITNESS: 6 A I see those words written, yes. 7 BY MS. PIANA: 8 Q Great. Great. So Clement characterizes 9 the system 200 as a system for transitioning; is 10 that correct? 11 A A block diagram of a system 200 for 12 transitioning from a virtual/augmented reality 13 environment to a ambient environment, yes. 14 Q And then further down in this column 15 around lines 55 to 57, thank you, it says starting 16 at the end of Line 54. In the example embodiment 17 shown in Figure 2, the sensing system 260 includes 18 a light sensor 262, a distance/proximity sensor 19 263, and an audio sensor 264, and the control 20 system 270 includes a power control device 271, a 21 pause control device 272, -- I'm not going to 22 spend anymore time reading the rest of this	291 1 area 320 or that the user is within a threshold 2 distance of a boundary of the tracking area 320. 3 Do you see that? 4 A I do. 5 Q Does this disclosure in Clement reveal 6 anything about how the HMD or how the proximity 7 detector detects a user's location within the 8 tracking area 320? 9 A Well, if we keep on reading the following 10 sentence, for example, one of the sensors of the 11 sensing system 160 such as for example proximity 12 sensor 163 and/or the camera 180 of HMD 100 may 13 detect this proximity to the boundary and the 14 control system 170/processor 190 may initiate the 15 transition process as described above. 16 Q Let's go to Figure 3A. So we looked at 17 this several times today. 18 So that disclosure that you were just 19 reading in that was what was, column 7, says: For 20 example, one of the sensors of the sensing system 21 such as, for example, a proximity sensor 163 22 and/or the camera 180 of the HMD 100 may detect
290 1 sentence, it's a very long sentence, but do you 2 see where I'm quoting from in Clement, 3 Dr. Roginska? 4 A Yes, I see that section. 5 Q Does this sentence disclose anything about 6 how the distance or proximity sensor 263 would 7 determine the user's position within the tracking 8 area? 9 A This particular section talks about the 10 sensing system and all the components that it 11 includes. 12 Q Does this section include any disclosure 13 teaching how the proximity sensor would determine 14 the user's position within the tracking area? 15 A This particular section doesn't disclose 16 how this would be done, no. 17 Q Let's go to column 7, I think you 18 mentioned that one also. Around Line 12. All 19 right. And so I'm looking at actually Line 7, the 20 sentence that starts: In some embodiments, the 21 HMD 100 may include a sensor that detects the 22 user's proximity to a boundary of the tracking	292 1 this proximity to the boundary and the control 2 system processor may initiate the transition 3 process as described above. Okay. I just wanted 4 to remind us what that said. 5 Here we are looking at Figure 3A. So the 6 user has the HMD on their head, correct? 7 A Correct. 8 Q And the disclosure we just looked at in 9 column 7 discloses that the HMD that's on the 10 user's head may have a camera; is that correct? 11 MR. HENRY: Objection to form, 12 mischaracterizes the document. 13 BY THE WITNESS: 14 A What we just read says that as an example 15 one of the sensors of the sensing system 160 16 and/or the camera of the HMD 100 may detect this 17 proximity to the boundary and the control system 18 and processor may initiate the transition process 19 as described above. 20 BY MS. PIANA: 21 Q So as a POSA how would a camera on the HMD 22 detect this invisible boundary that's here at the

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293 1 bottom of Figure 3A? This is the one that is 2 horizontal and runs between point four and point 3 five, how could a camera see an invisible 4 boundary? 5 MR. HENRY: Objection. Form, 6 argumentative, asked and answered a few times 7 earlier today and beyond the scope of my redirect. 8 BY THE WITNESS: 9 A So, I'm sorry, what was the question, how 10 would the camera on the HMD detect the invisible 11 line? 12 BY MS. PIANA: 13 Q Yes. 14 MR. HENRY: Same objections. 15 BY THE WITNESS: 16 A Well, I mean Clement here specifically in 17 this passage doesn't describe how it would detect 18 it. It describes that it could detect it given 19 the sensors that it has and it describes the 20 sensors on the HMD. 21 BY MS. PIANA: 22 Q Turning to the '836 declaration which we	295 1 CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC 2 I, Theresa A. Vorkapic, Certified 3 Reporter and Notary Public within and for the 4 State of Illinois do hereby certify: 5 That DR. AGNIESZKA ROGINSKA, the witness 6 whose deposition is hereinbefore set forth, 7 Was duly sworn by me before the 8 commencement of such deposition and that such 9 deposition was taken before me and is a true 10 record of the testimony given by such witness. 11 I further certify that the adverse 12 party, patent owner, was represented by counsel at 13 the deposition. 14 I further certify that the deposition of 15 DR. AGNIESZKA ROGINSKA, occurred virtually on 16 Tuesday, February 27, 2024, commencing at 9:30 to 17 6:38 p.m. 18 I further certify the inspection, 19 reading and signing of said deposition was 20 waived on the record by agreement of all parties. 21 I further certify that I am not related 22 to any of the parties to this action by blood
294 1 had marked as Exhibit 7, do you stand by all of 2 the opinions as stated in the '836 declaration? 3 A I do. 4 MS. PIANA: All right. No further 5 questions. 6 MR. HENRY: I have nothing further. Thank 7 you, Dr. Roginska. 8 THE VIDEOGRAPHER: Since there are no more 9 questions, this marks the end of the video 10 deposition of Dr. Roginska. We are going off the 11 record and ending her deposition at 6:38 p.m. 12 Central time. Thank you. 13 (Deposition concluded at 6:38 p.m. CST.) 14 15 16 17 18 19 20 21 22	296 1 or marriage, I am not employed by or an attorney 2 to any of the parties to this action, and that I 3 am in no way interested, financially or otherwise, 4 in the outcome of this matter. 5 IN WITNESS WHEREOF, I have hereunto set 6 my hand this 29th day of February, 2024. 7 8  9 10 Theresa A. Vorkapic 11 My commission expires November 6, 2027. 12 NOTARY PUBLIC IN AND FOR THE 13 ILLINOIS 14 15 16 17 18 19 20 21 22

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