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# Transcript of Dr. Chris Kyriakakis

**Date:** August 23, 2024

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

**Planet Depos**

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WORLDWIDE COURT REPORTING & LITIGATION TECHNOLOGY

Eight khz, LLC  
Exhibit 2031  
IPR2023-01003  
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Transcript of Dr. Chris Kyriakakis  
Conducted on August 23, 2024

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|    |                                                    |    |                                              |
|----|----------------------------------------------------|----|----------------------------------------------|
| 1  | 1                                                  | 1  | 3                                            |
| 2  | UNITED STATES PATENT AND TRADEMARK OFFICE          | 2  | A P P E A R A N C E S                        |
| 3  | -----                                              | 3  | ATTORNEYS FOR PATENT OWNER:                  |
| 4  | BEFORE THE PATENT TRIAL AND APPEAL BOARD           | 4  | JAYME PARTRIDGE, ESQUIRE                     |
| 5  | -----                                              | 5  | HOMAYOON RAFATIJO, PH.D., ESQUIRE            |
| 6  | META PLATFORMS, INC.,                              | 6  | BOCHNER PLLC                                 |
| 7  | Petitioner,                                        | 7  | 1040 Avenue of the Americas, 15th Floor      |
| 8  | V.                                                 | 8  | New York, NY 10018                           |
| 9  | EIGHT KHZ, LLC,                                    | 9  | 646.971.0685                                 |
| 10 | Patent Owner.                                      | 10 |                                              |
| 11 | -----                                              | 11 | ATTORNEYS FOR PETITIONER:                    |
| 12 | Case IPR2023-01003                                 | 12 | DAVID TENNANT, ESQUIRE                       |
| 13 | U.S. Patent No. 9,226,090                          | 13 | PAUL HASTINGS                                |
| 14 | -----                                              | 14 | 2050 M St NW                                 |
| 15 | REMOTE VIDEOTAPED DEPOSITION OF                    | 15 | Washington, DC 20036                         |
| 16 | DR. CHRIS KYRIAKAKIS                               | 16 | 202.551.1997                                 |
| 17 | Friday, August 23, 2024                            | 17 |                                              |
| 18 | 12:01 P.M. (EST)                                   | 18 |                                              |
| 19 | Job No.: 549462                                    | 19 | ALSO PRESENT:                                |
| 20 | Pages: 1 - 100                                     | 20 | Jesse Castro, Planet Depos Remote Technician |
| 21 | Reported By: Anita M. Trombetta, RMR, CRR,         | 21 | Malcolm Cooke, Planet Depos Videographer     |
| 22 | California CSR No. 14647                           | 22 |                                              |
| 1  | 2                                                  | 1  | 4                                            |
| 2  |                                                    | 1  | -----I N D E X-----                          |
| 3  |                                                    | 2  | WITNESS                                      |
| 4  | Virtual Videotaped Deposition of                   | 3  | DR. CHRIS KYRIAKAKIS                         |
| 5  | DR. CHRIS KYRIAKAKIS, conducted via Zoom, before   | 4  | EXAMINATION BY                               |
| 6  | Anita M. Trombetta, a Certified Shorthand Reporter | 5  | Page                                         |
| 7  | in the State of California, RMR, CRR, and Notary   | 6  | ATTORNEY PARTRIDGE                           |
| 8  | Public in and for the State of New York.           | 7  | 6                                            |
| 9  |                                                    | 8  | -----E X H I B I T S-----                    |
| 10 |                                                    | 9  | Exhibit                                      |
| 11 |                                                    | 10 | Exhibit 1001                                 |
| 12 |                                                    | 11 | Exhibit 2029                                 |
| 13 |                                                    | 12 | Exhibit 2030                                 |
| 14 |                                                    | 13 | Exhibit 1055                                 |
| 15 |                                                    | 14 | Exhibit 1026                                 |
| 16 |                                                    | 15 | Description                                  |
| 17 |                                                    | 16 | '090 Patent                                  |
| 18 |                                                    | 17 | Transcript of Dr.                            |
| 19 |                                                    | 18 | Gregory F. Welch                             |
| 20 |                                                    | 19 | Transcript of Dr.                            |
| 21 |                                                    | 20 | Agnieszka Roginska                           |
| 22 |                                                    | 21 | Declaration of Dr.                           |
|    |                                                    | 22 | Chris Kyriakakis                             |
|    |                                                    |    | in Support of                                |
|    |                                                    |    | Petitioner'S Reply                           |
|    |                                                    |    | to Patent Owner'S                            |
|    |                                                    |    | Response                                     |
|    |                                                    |    | Document Entitled,                           |
|    |                                                    |    | Sound Localization                           |
|    |                                                    |    | by Human Listeners                           |

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| <p>5</p> <p>1 PROCEEDINGS</p> <p>2 THE VIDEOGRAPHER: Here begins Media</p> <p>3 No. 1 in the videotaped deposition of</p> <p>4 Dr. Chris Kyriakakis, in the matter of</p> <p>5 Meta Platforms, Inc. v. Eight kHz LLC, PTAB, in</p> <p>6 the United States Patent and Trademark Office</p> <p>7 before the Patent Trial and Appeal Board, Case No.</p> <p>8 IPR2023-01003.</p> <p>9 Today's date is August 23, 2024. The time</p> <p>10 on the video monitor is 12:01 P.M. Eastern Time.</p> <p>11 The remote videographer today is</p> <p>12 Malcolm Cooke, representing Planet Depos. All</p> <p>13 parties of this is video deposition are attending</p> <p>14 remotely.</p> <p>15 Would counsel please voice identify</p> <p>16 themselves and state whom they represent.</p> <p>17 ATTORNEY PARTRIDGE: Jayme Partridge, and</p> <p>18 I represent Eight kHz. And I have with me my</p> <p>19 colleague, and do you want to introduce yourself,</p> <p>20 Homi?</p> <p>21 MR. RAFATIJO: Sure. Homayoon Rafatijo</p> <p>22 from the firm of Bochner, and representing</p> | <p>7</p> <p>1 I could call you Dr. K, right?</p> <p>2 <b>A Yes. That would save time, too.</b></p> <p>3 Q Okay. That's true.</p> <p>4 So my name is Jayme Partridge, and we've</p> <p>5 met before because I deposed you I think one other</p> <p>6 time, correct?</p> <p>7 <b>A That's right.</b></p> <p>8 Q Okay. We haven't talked or anything since</p> <p>9 then, right?</p> <p>10 <b>A We have not.</b></p> <p>11 Q And do you understand that you are being</p> <p>12 deposed in IPR2023-01003 today, right?</p> <p>13 <b>A Correct.</b></p> <p>14 Q Okay. And it's regarding the U.S. Patent</p> <p>15 No. 9,226,090, correct?</p> <p>16 <b>A Correct.</b></p> <p>17 Q And is there -- I'm not going to go</p> <p>18 through all the -- I know you know how to depose</p> <p>19 and how a deposition works, or how to answer</p> <p>20 questions, but is there any reason today you can't</p> <p>21 give true and accurate testimony?</p> <p>22 <b>A There is not.</b></p>                                                             |
| <p>6</p> <p>1 Eight kHz.</p> <p>2 ATTORNEY TENNANT: Hi, David Tennant for</p> <p>3 Meta Platforms, Inc. I'm with the firm of</p> <p>4 Paul Hastings.</p> <p>5 THE VIDEOGRAPHER: The court reporter</p> <p>6 today is Anita Trombetta, representing</p> <p>7 Planet Depos.</p> <p>8 The witness will now be sworn.</p> <p>9 DR. CHRIS KYRIAKAKIS,</p> <p>10 called as a witness, having been duly</p> <p>11 sworn by a Notary Public, was examined and</p> <p>12 testified as follows:</p> <p>13 ATTORNEY PARTRIDGE: Thank you.</p> <p>14 EXAMINATION BY</p> <p>15 ATTORNEY PARTRIDGE:</p> <p>16 Q Good morning, Dr. Kyriakakis. How are</p> <p>17 you?</p> <p>18 <b>A I'm fine. Thank you, good morning.</b></p> <p>19 Q Did I say your name right?</p> <p>20 <b>A You did.</b></p> <p>21 Q Okay. I'm going to try to say your name</p> <p>22 like, but if not, you gave me -- you told me that</p>                                                                                                                                                                         | <p>8</p> <p>1 Q Okay. I'm just going to jump right into</p> <p>2 it, and right in the kind of -- just right in the</p> <p>3 thick of it. Okay?</p> <p>4 <b>A Okay.</b></p> <p>5 Q So, Dr. K, is there any difference</p> <p>6 between, one, processing non-binaural sound to</p> <p>7 synthesize binaural sound; and, two, adjusting an</p> <p>8 ITD for binaural sound?</p> <p>9 ATTORNEY TENNANT: Objection. Lack of</p> <p>10 foundation.</p> <p>11 <b>A That seems like a compound question.</b></p> <p>12 <b>Difficult to compare. So I'm not -- I'm not</b></p> <p>13 <b>quite -- maybe we need to break it down a bit.</b></p> <p>14 <b>It's not quite obvious to me what you're asking.</b></p> <p>15 Q Do you understand what processing</p> <p>16 non-binaural sound to synthesize binaural sound</p> <p>17 means?</p> <p>18 <b>A I do.</b></p> <p>19 Q Okay. That's -- that's -- you're an</p> <p>20 expert on that, right? In that area?</p> <p>21 <b>A That's right.</b></p> <p>22 Q And do you understand what an ITD is, in</p> |

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| <p>9</p> <p>1 your field of technology?</p> <p>2 <b>A I understand, yes.</b></p> <p>3 Q What does ITD stand for?</p> <p>4 <b>A It stands for interaural time difference,</b></p> <p>5 <b>and represents the time delay of arrival of a</b></p> <p>6 <b>sound at the two ears.</b></p> <p>7 Q And do you understand that an ITD can be</p> <p>8 adjusted?</p> <p>9 ATTORNEY TENNANT: Objection. Form.</p> <p>10 <b>A Yes, I was -- I was just -- I'm hesitating</b></p> <p>11 <b>because the word "an" means it's a single thing.</b></p> <p>12 <b>ITD is a quantity that could be adjusted, but it</b></p> <p>13 <b>requires two things. It's a relative adjustment</b></p> <p>14 <b>between two signals.</b></p> <p>15 Q Okay. And what you're quibbling with was</p> <p>16 when I said "an ITD," so I should have said, do</p> <p>17 you understand that ITD can be adjusted?</p> <p>18 <b>A Yes, I think that's more accurate.</b></p> <p>19 Q Now, is there a difference between</p> <p>20 processing -- let me go back, start back.</p> <p>21 Do you understand what non-binaural sound</p> <p>22 is basically?</p>      | <p>11</p> <p>1 Q Adjusting ITD for binaural sound. So for</p> <p>2 binaural sound that is already binaural sound.</p> <p>3 <b>A There -- there are cases where we have</b></p> <p>4 <b>binaural sound and we want to adjust ITD for it to</b></p> <p>5 <b>make it appear that the sound source is coming</b></p> <p>6 <b>from a different location other than the original.</b></p> <p>7 <b>And so in my mind, that's a form of processing.</b></p> <p>8 Q Is that all the ways you can -- and -- but</p> <p>9 that's a form of processing binaural sound,</p> <p>10 correct?</p> <p>11 <b>A What I just described is a form of</b></p> <p>12 <b>processing binaural sound. You can adjust the</b></p> <p>13 <b>delay ITD between two signals of any kind. We're</b></p> <p>14 <b>talking about binaural sounds, so my response was</b></p> <p>15 <b>for that.</b></p> <p>16 Q Okay. And is there a difference between</p> <p>17 adjusting ITD for binaural sound to simply</p> <p>18 processing non-binaural sound to synthesize</p> <p>19 binaural sound?</p> <p>20 ATTORNEY TENNANT: Objection. Form.</p> <p>21 <b>A "Processing" is a more general term. So</b></p> <p>22 <b>it covers ITD, but it also covers other methods</b></p> |
| <p>10</p> <p>1 ATTORNEY TENNANT: Objection to form.</p> <p>2 <b>A I do.</b></p> <p>3 Q And do you understand that non-binaural</p> <p>4 sound can be synthesized to make binaural sound?</p> <p>5 <b>A Yes, I understand.</b></p> <p>6 Q Okay. And is there a difference between</p> <p>7 synthesizing non-binaural sound to make binaural</p> <p>8 sound and adjusting an ITD for binaural sound?</p> <p>9 And let me strike that.</p> <p>10 ATTORNEY PARTRIDGE: Sorry, David, I</p> <p>11 didn't -- Mr. Tennant, you know.</p> <p>12 Strike that. Because I said "an ITD," so</p> <p>13 I want to say that a little differently.</p> <p>14 Q Is there a difference in your mind, as an</p> <p>15 expert in this area, between synthesizing</p> <p>16 non-binaural sound to make binaural sound and</p> <p>17 adjusting ITD for binaural sound?</p> <p>18 ATTORNEY TENNANT: Objection. Form.</p> <p>19 <b>A Okay. The second part is adjusting ITD.</b></p> <p>20 <b>Are you saying to make binaural sound or to adjust</b></p> <p>21 <b>sound that's already binaural? I'm not clear on</b></p> <p>22 <b>that part.</b></p> | <p>12</p> <p>1 <b>for adjusting binaural sound.</b></p> <p>2 Q Okay. So when you are processing</p> <p>3 non-binaural sound to synthesize it into binaural</p> <p>4 sound, you do not have binaural sound as an input,</p> <p>5 correct?</p> <p>6 <b>A Well, you said non-binaural sound, so that</b></p> <p>7 <b>means it's not binaural.</b></p> <p>8 Q Right. So when you are changing it from,</p> <p>9 like, non-binaural sound to binaural sound, you're</p> <p>10 starting with non-binaural sound, correct?</p> <p>11 ATTORNEY TENNANT: Objection. Asked and</p> <p>12 answered.</p> <p>13 <b>A That's what you're asking, I believe, yes.</b></p> <p>14 Q Okay. And when we talk about adjusting</p> <p>15 ITD for binaural sound, we are talking about</p> <p>16 adjusting binaural sound that already exists,</p> <p>17 correct?</p> <p>18 <b>A Not necessarily. That was the example you</b></p> <p>19 <b>gave me, but we can adjust the ITD of non-binaural</b></p> <p>20 <b>sound as well. And combined with other methods,</b></p> <p>21 <b>it can make it binaural, just as -- it falls under</b></p> <p>22 <b>the category of processing, to make non-binaural</b></p>                                                  |

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| <p>13</p> <p>1 <b>sound binaural.</b></p> <p>2 Q Okay. So if one processes binaural -- I'm</p> <p>3 sorry, strike that.</p> <p>4 If one processes non-binaural sound --</p> <p>5 strike that. Let me restart.</p> <p>6 Are you familiar with HRTFs?</p> <p>7 <b>A The notion, yes. I'm familiar with HRTFs.</b></p> <p>8 Q Okay. You're an expert in this area, so</p> <p>9 you're familiar with HRTFs, correct?</p> <p>10 <b>A Correct.</b></p> <p>11 Q So if -- if one processes non-binaural</p> <p>12 sound, so we're starting with non-binaural sound,</p> <p>13 with HRTFs to localize the sound at a location</p> <p>14 five meters away, would you say that I have</p> <p>15 synthesized binaural sound?</p> <p>16 ATTORNEY TENNANT: Objection, form. Lack</p> <p>17 of foundation.</p> <p>18 <b>A It depends on whether the HRTFs correspond</b></p> <p>19 <b>to five meters away.</b></p> <p>20 Q Okay. So if the HRTFs correspond to</p> <p>21 five meters away, would you -- would you say that</p> <p>22 binaural sound has been synthesized?</p>                                            | <p>15</p> <p>1 <b>A Adjusted in what way?</b></p> <p>2 Q I'm asking you a very broad question. Can</p> <p>3 it -- first, can be it adjusted by changing the</p> <p>4 ITD?</p> <p>5 <b>A Adjustments can be made by changing the</b></p> <p>6 <b>ITD.</b></p> <p>7 Q And you agree that the binaural sound is</p> <p>8 adjusted when its ITD is altered?</p> <p>9 ATTORNEY TENNANT: Objection to form.</p> <p>10 <b>A The binaural sound that consists of two</b></p> <p>11 <b>signals, one for each ear, if we change the ITD</b></p> <p>12 <b>between those two signals - it's a relative</b></p> <p>13 <b>number, as we said - then we are adjusting the</b></p> <p>14 <b>binaural sound.</b></p> <p>15 Q Let's -- did you say you have -- oh, you</p> <p>16 know, I need to ask you just a few introductory</p> <p>17 questions. It appears to me you guys aren't in</p> <p>18 the same room, right?</p> <p>19 <b>A (No verbal response.)</b></p> <p>20 Q Okay. And --</p> <p>21 (Reporter clarification.)</p> <p>22 <b>A Correct. We're in different places.</b></p>          |
| <p>14</p> <p>1 <b>A I would.</b></p> <p>2 Q Once binaural sound is synthesized, can</p> <p>3 you adjust it by changing it -- changing its ITD?</p> <p>4 ATTORNEY TENNANT: Objection --</p> <p>5 <b>A That's -- sorry.</b></p> <p>6 ATTORNEY TENNANT: That's okay.</p> <p>7 <b>A I just wanted to add to my previous</b></p> <p>8 <b>answer, when I said it's synthesized with the</b></p> <p>9 <b>HRTFs at five meters, it's synthesized assuming</b></p> <p>10 <b>it's sound that's played over headphones into the</b></p> <p>11 <b>ears of a listener. Otherwise, it's just sitting</b></p> <p>12 <b>there not doing anything. So I just -- it's a</b></p> <p>13 <b>minor thing, but I just wanted to add that.</b></p> <p>14 Q Thank you.</p> <p>15 <b>A So the second part is -- I'm sorry, could</b></p> <p>16 <b>you repeat it, the ITD?</b></p> <p>17 Q So we're to the point where the binaural</p> <p>18 sound is synthesized. Okay?</p> <p>19 <b>A Yes.</b></p> <p>20 Q Can that -- can that sound be adjusted by</p> <p>21 changing the ITD?</p> <p>22 ATTORNEY TENNANT: Objection. Form.</p> | <p>16</p> <p>1 Q It looks like you're different. You have</p> <p>2 a really cool looking wall back there, and, I'm</p> <p>3 sorry, Mr. Tennant doesn't.</p> <p>4 But, okay, I just want to make sure you're</p> <p>5 not communicating during the deposition, except</p> <p>6 during breaks and things like that, correct?</p> <p>7 <b>A Correct.</b></p> <p>8 Q Okay.</p> <p>9 ATTORNEY PARTRIDGE: So you said some of</p> <p>10 the exhibits, Mr. Tennant, from the IPR. Do you</p> <p>11 have 1001, which is the '090 patent?</p> <p>12 Q And Dr. Kyriakakis -- Kyriakakis, sorry.</p> <p>13 Dr. K, do you have 1001?</p> <p>14 <b>A I do.</b></p> <p>15 ATTORNEY TENNANT: I do as well.</p> <p>16 ATTORNEY PARTRIDGE: Okay. And I think</p> <p>17 Homi has dropped it into the chat as well.</p> <p>18 Q Now, just so -- I assume you don't have</p> <p>19 anything else up on your computer or anything, so</p> <p>20 you're looking at Exhibit 1001?</p> <p>21 <b>A Yes, I have the folder with all the other</b></p> <p>22 <b>exhibits, but none of them are open.</b></p> |

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>17</p> <p>1 Q So if you will open the '090 patent,<br/>2 please.<br/>3 <b>A Okay. Yes.</b><br/>4 Q Or you can look at it in the chat as well.<br/>5 <b>A I have it on a different monitor. It's</b><br/>6 <b>easier this way.</b><br/>7 Q You can take your time to familiarize<br/>8 yourself with it and then we can talk about<br/>9 whenever you're ready.<br/>10 <b>A I'm ready. I guess I might take a little</b><br/>11 <b>time depending on your question, but I'm ready.</b><br/>12 Q Okay. So let's go to -- I'm going to just<br/>13 move to Claim 8 of the '090 patent, and that's on<br/>14 column -- it's beginning Column 43, Line 39. And<br/>15 just let me know when you're there.<br/>16 <b>A I'm there.</b><br/>17 Q Okay. And I would like to focus on the<br/>18 last limitation of that claim. And do you see<br/>19 where it begins with, "Maintain"?<br/>20 <b>A Oh, I'm sorry, I thought you were at</b><br/>21 <b>Line 49. The last -- yes. I see the last, yes.</b><br/>22 Q Yeah, well, I --</p>                              | <p>19</p> <p>1 Q Okay. Sure.<br/>2 <b>A (Document review.)</b><br/>3 <b>Okay.</b><br/>4 Q I want to just ask you if about if someone<br/>5 was going to practice this limitation, okay?<br/>6 <b>A Mm-hmm.</b><br/>7 Q Would you need to determine how the first<br/>8 individual is moving their head orientation with<br/>9 respect to the SLP?<br/>10 ATTORNEY TENNANT: Objection to form.<br/>11 Lack of foundation.<br/>12 <b>A Sorry, I just need to make it clear in my</b><br/>13 <b>head what's the first and the second. So just</b><br/>14 <b>give me one second.</b><br/>15 Q Yeah, that confuses me too. But take your<br/>16 time, please.<br/>17 <b>A Okay. You're asking, again -- could you</b><br/>18 <b>repeat it? I got it now.</b><br/>19 Q Yes. So to practice this limitation,<br/>20 would one need to determine how the first<br/>21 individual is moving the -- their head orientation<br/>22 with respect to the SLP?</p>                                 |
| <p>18</p> <p>1 <b>A I got it.</b><br/>2 Q What did I say -- oh, 39, Line 39. If I<br/>3 said 49, I apologize.<br/>4 But you see where this limitation -- I'm<br/>5 going to refer to it as Limitation D sometimes.<br/>6 Do you see this limitation?<br/>7 <b>A Yes, I see it.</b><br/>8 Q And will you read it into the record,<br/>9 please.<br/>10 <b>A "Maintain the origin of the voice of the</b><br/>11 <b>second individual at the sound localization point,</b><br/>12 <b>but alter an interaural time difference of the</b><br/>13 <b>voice that the first individual hears in response</b><br/>14 <b>to the first individual moving the head</b><br/>15 <b>orientation with respect to the sound localization</b><br/>16 <b>point."</b><br/>17 Q Thank you. So I want to ask you just a<br/>18 few questions about this limitation of the claim.<br/>19 Do you want to read the whole claim again to<br/>20 familiarize yourself, or are you familiar with it?<br/>21 <b>A I can take a minute to read it if you</b><br/>22 <b>don't mind.</b></p> | <p>20</p> <p>1 ATTORNEY TENNANT: Objection, form. Lack<br/>2 of foundation.<br/>3 <b>A The way the claim is written, you would</b><br/>4 <b>have to -- it says to alter the ITD to account for</b><br/>5 <b>movement.</b><br/>6 Q Of the first --<br/>7 <b>A Of the first individual. It doesn't</b><br/>8 <b>specifically say in determining the position or</b><br/>9 <b>anything like that. It just says to account for</b><br/>10 <b>movement, right?</b><br/>11 Q Okay. So you would have to account for<br/>12 the head movement of the first individual,<br/>13 correct?<br/>14 <b>A The head orientation is what it says.</b><br/>15 Q Okay. So one would have to account for<br/>16 the head orientation of the first individual,<br/>17 correct?<br/>18 <b>A That's how I read it.</b><br/>19 Q And how would you determine or measure the<br/>20 head orientation of the first individual with<br/>21 respect to the SLP?<br/>22 ATTORNEY TENNANT: Objection to form.</p> |

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| <p style="text-align: right;">21</p> <p>1 Lack of foundation.</p> <p>2 <b>A There are multiple ways to determine head</b></p> <p>3 <b>orientation. So one of them would be used,</b></p> <p>4 <b>depending on the application, I suppose.</b></p> <p>5 Q Would -- tell me some of those ways.</p> <p>6 <b>A There are visual methods that are -- that</b></p> <p>7 <b>track the location and distance of the eyes, and</b></p> <p>8 <b>that gives you what's called gaze direction, which</b></p> <p>9 <b>is related to the orientation of your head. There</b></p> <p>10 <b>are -- there are devices that can be put on the</b></p> <p>11 <b>head of the person that broadcast the orientation.</b></p> <p>12 <b>Let's see, what else? There are other devices</b></p> <p>13 <b>called motion capture devices that have multiple</b></p> <p>14 <b>sensors, that the receiving end interprets the</b></p> <p>15 <b>position of those centers -- sensors to determine</b></p> <p>16 <b>orientation.</b></p> <p>17 <b>So there are multiple ways.</b></p> <p>18 Q Okay. So would you basically need some</p> <p>19 sort of head tracking mechanism?</p> <p>20 ATTORNEY TENNANT: Objection. Form.</p> <p>21 <b>A You would need a head orientation tracking</b></p> <p>22 <b>mechanism.</b></p> | <p style="text-align: right;">23</p> <p>1 it's up, down, and towards you.</p> <p>2 <b>A Right. But that's describing a</b></p> <p>3 <b>three-dimensional system of some sort. But it</b></p> <p>4 <b>depends on how they're updated or recorded or</b></p> <p>5 <b>monitored. I -- I don't know how to say it, how</b></p> <p>6 <b>to answer it better than that.</b></p> <p>7 Q Can you use cartesian coordinates to</p> <p>8 describe head orientation?</p> <p>9 ATTORNEY TENNANT: Objection. Lack of</p> <p>10 foundation.</p> <p>11 <b>A With the right kind of sensors, yes, you</b></p> <p>12 <b>can.</b></p> <p>13 Q Okay. Can we go back. You have exhibit,</p> <p>14 it's 1001, the patent, open, correct?</p> <p>15 <b>A I do, yes.</b></p> <p>16 Q And can you look at Claim 8 again?</p> <p>17 <b>A Okay.</b></p> <p>18 Q And -- I'm sorry. And do you agree that</p> <p>19 Claim 8 discloses a telephone call between a first</p> <p>20 individual and a second individual?</p> <p>21 ATTORNEY TENNANT: Objection. Form.</p> <p>22 <b>A The first notation calls it an electronic</b></p> |
| <p style="text-align: right;">22</p> <p>1 Q And -- I'm sorry, Dr. K --</p> <p>2 <b>A No, sorry, I was --</b></p> <p>3 Q I really apologize.</p> <p>4 <b>A No worries.</b></p> <p>5 Q That's the crucial sin in depositions, to</p> <p>6 interrupt you. So, sorry.</p> <p>7 <b>A No problem.</b></p> <p>8 Q And can -- and can a change in head</p> <p>9 orientation include a change in pitch, yaw, or</p> <p>10 roll angles?</p> <p>11 ATTORNEY TENNANT: Objection. Lack of</p> <p>12 foundation.</p> <p>13 <b>A Those parameters are one way of</b></p> <p>14 <b>describing, but not the only way, the head</b></p> <p>15 <b>orientation.</b></p> <p>16 Q Can you also use X, Y, and Z coordinates</p> <p>17 to describe head orientation?</p> <p>18 ATTORNEY TENNANT: Objection. Lack of</p> <p>19 foundation.</p> <p>20 <b>A I'm not sure what the X, Y, and Z</b></p> <p>21 <b>coordinates would correspond to in this case.</b></p> <p>22 Q Generally when I think of X, Y, and Z,</p>                                                                                                                                                                                                                                                                                                 | <p style="text-align: right;">24</p> <p>1 <b>call.</b></p> <p>2 Q Okay. And that's a telephone call, right?</p> <p>3 <b>A A telephone call is a kind of electronic</b></p> <p>4 <b>call, but there are other call -- other types of</b></p> <p>5 <b>electronic calls.</b></p> <p>6 Q Okay.</p> <p>7 <b>A Like the one we're having right now, for</b></p> <p>8 <b>example.</b></p> <p>9 Q So Claim 8 discloses an electric call --</p> <p>10 electronic call between a first individual and a</p> <p>11 second individual, correct?</p> <p>12 <b>A Yes, that's correct.</b></p> <p>13 Q So in this claim, who was the listener?</p> <p>14 ATTORNEY TENNANT: Objection. Form.</p> <p>15 <b>A The listener -- the listener is the person</b></p> <p>16 <b>not talking, assuming they're not talking over</b></p> <p>17 <b>each other.</b></p> <p>18 Q Okay. Is the listener the first or second</p> <p>19 individual in the claim?</p> <p>20 <b>A The language is confusing, so I need to</b></p> <p>21 <b>read it again.</b></p> <p>22 <b>It appears that the listener is the one</b></p>               |

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| <p style="text-align: right;">25</p> <p>1 wearing the electronic earphone in the limit -- in</p> <p>2 the first limitation. So the first individual, is</p> <p>3 the way it's written.</p> <p>4 (Reporter clarification.)</p> <p>5 A In the first limitation it says the</p> <p>6 individual -- the first individual wearing an</p> <p>7 electronic earphone. So I would assume that</p> <p>8 that's the listener.</p> <p>9 Q So in Claim 8, the listener is the first</p> <p>10 individual, correct?</p> <p>11 ATTORNEY TENNANT: Objection. Asked and</p> <p>12 answered.</p> <p>13 A That's how I read it.</p> <p>14 Q So I want you to look at the claim and I</p> <p>15 want you to tell me at what limitation in Claim 8,</p> <p>16 the listener, first individual, first hears the</p> <p>17 voice of the speaker, the second individual.</p> <p>18 ATTORNEY TENNANT: Objection to form.</p> <p>19 Lack of foundation.</p> <p>20 A I'm not sure I understand what you mean by</p> <p>21 "first." Are you saying when the call starts or</p> <p>22 what -- I'm not understanding the question.</p> | <p style="text-align: right;">27</p> <p>1 Q Just generally, how do people hear their</p> <p>2 voices when they're speaking?</p> <p>3 ATTORNEY TENNANT: Objection, form. Asked</p> <p>4 and answered.</p> <p>5 A If I'm standing in a big space away from</p> <p>6 walls and other things, I generally hear it in</p> <p>7 front of my face. If I'm standing near a wall, I</p> <p>8 often hear it as a reflection, and so it appears</p> <p>9 to be coming from the wall.</p> <p>10 Q Do you hear it in front of your mouth?</p> <p>11 ATTORNEY TENNANT: Objection. Form.</p> <p>12 A I don't know if I'm able to pinpoint it</p> <p>13 that way. My brain knows that my mouth is moving.</p> <p>14 And so it's in that general vicinity, but it's not</p> <p>15 something that we -- I don't know of any studies</p> <p>16 that have looked -- that have looked at where</p> <p>17 people perceive it. It's not just a single person</p> <p>18 that can just answer that. Different people have</p> <p>19 different answers.</p> <p>20 Q Do some people perceive it inside their</p> <p>21 head?</p> <p>22 ATTORNEY TENNANT: Objection to form.</p> |
| <p style="text-align: right;">26</p> <p>1 Q Yes.</p> <p>2 A In this language, perhaps it means it's</p> <p>3 the third one, where it says, "Execute the</p> <p>4 electronic call." It's not really clear.</p> <p>5 Q Okay. So that would be -- you're talking</p> <p>6 about the limitation that starts with "Execute the</p> <p>7 electronic call," correct?</p> <p>8 A Correct.</p> <p>9 Q And that's 8C, as we've -- if we're</p> <p>10 lettering those A, B, C, and D?</p> <p>11 A Yes.</p> <p>12 Q So changing subjects, I'm going to ask you</p> <p>13 some questions about, when you are talking, how do</p> <p>14 you hear your own voice?</p> <p>15 A It's through a combination of sound</p> <p>16 entering my ears and sound traveling through my</p> <p>17 bones on my face.</p> <p>18 Q So where do you hear it? Do you hear it</p> <p>19 in front of your mouth or inside your head?</p> <p>20 A I think that depends on the person and the</p> <p>21 environment that they're in. It's not a single --</p> <p>22 single -- single answer.</p>                                            | <p style="text-align: right;">28</p> <p>1 A You're speaking now of natural speech, no</p> <p>2 headphones or anything else involved?</p> <p>3 Q Correct.</p> <p>4 A I'm not aware of that, of anybody</p> <p>5 reporting that. But again, I don't -- I haven't</p> <p>6 looked at that literature specifically.</p> <p>7 Q What literature?</p> <p>8 A People doing experiments about</p> <p>9 self-localization of voice, for example. It might</p> <p>10 be there, I just -- I'm not aware of any specific</p> <p>11 literature.</p> <p>12 Q Does your voice originate from outside</p> <p>13 your head?</p> <p>14 ATTORNEY TENNANT: Objection to form.</p> <p>15 Lack of foundation.</p> <p>16 A Voice generation is complicated. It -- it</p> <p>17 involves vibrations of vocal cords inside your</p> <p>18 throat, and then air waves are created then to</p> <p>19 respond to the sound, and then your mouth moves.</p> <p>20 So I don't know what to call the origin in this</p> <p>21 discussion.</p> <p>22 Q Do you believe your voice originates</p>                                                                                      |

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| <p style="text-align: right;">29</p> <p>1 outside your head?</p> <p>2 ATTORNEY TENNANT: Objection. Asked and</p> <p>3 answered.</p> <p>4 <b>A To the extent that we say that it's the</b></p> <p>5 <b>air that has just exited my mouth, yes.</b></p> <p>6 Q But it's right at your mouth, right?</p> <p>7 ATTORNEY TENNANT: Objection. Form.</p> <p>8 <b>A Well, as I said before, it depends on</b></p> <p>9 <b>where I'm standing. I could easily make my voice</b></p> <p>10 <b>believe -- or convince myself that my voice is</b></p> <p>11 <b>originating from this nearby wall here, if I stood</b></p> <p>12 <b>in front of it.</b></p> <p>13 Q In absence of echo or reverb, your voice</p> <p>14 comes from inside your head, right?</p> <p>15 ATTORNEY TENNANT: Objection. Asked and</p> <p>16 answered.</p> <p>17 <b>A I think it comes from your mouth.</b></p> <p>18 Q From right in front of your mouth,</p> <p>19 correct?</p> <p>20 ATTORNEY TENNANT: Objection. Asked and</p> <p>21 answered.</p> <p>22 <b>A That's -- that's my answer.</b></p>                                                    | <p style="text-align: right;">31</p> <p>1 <b>other senses as well, and so I can believe that my</b></p> <p>2 <b>voice is coming from somewhere else if other cues</b></p> <p>3 <b>are present.</b></p> <p>4 Q Okay. So when we're not talking about</p> <p>5 ventriloquism, which I didn't say right, but</p> <p>6 whatever that word is, just like your voice -- I</p> <p>7 meant just like your name.</p> <p>8 So in the absence of any kind of</p> <p>9 ventriloquism, echoing reverb, your voice is not</p> <p>10 external to you, correct?</p> <p>11 ATTORNEY TENNANT: Objection. Lack of</p> <p>12 foundation.</p> <p>13 <b>A It appears to come from the front of my</b></p> <p>14 <b>mouth.</b></p> <p>15 Q Okay. So does your voice originate from</p> <p>16 outside your head?</p> <p>17 ATTORNEY TENNANT: Objection. Asked and</p> <p>18 answered.</p> <p>19 <b>A I consider the front of my mouth just</b></p> <p>20 <b>outside my head.</b></p> <p>21 Q Do you hear your own voice as a binaural</p> <p>22 sound?</p>                                                                                                                                                                                                                                |
| <p style="text-align: right;">30</p> <p>1 Q You agree that it comes from right in</p> <p>2 front of your mouth, correct?</p> <p>3 ATTORNEY TENNANT: Objection. Asked and</p> <p>4 answered.</p> <p>5 <b>A Subject to the limitations you just</b></p> <p>6 <b>mentioned that I was talking about, yes.</b></p> <p>7 Q Do you hear your voice as if it originates</p> <p>8 from 10 meters away from you, in the absence of</p> <p>9 reverb and echo?</p> <p>10 ATTORNEY TENNANT: Objection. Lack of</p> <p>11 foundation.</p> <p>12 <b>A Generally, no.</b></p> <p>13 Q So an absence of echoing -- oh. In</p> <p>14 absence of echo and reverb, your voice is not</p> <p>15 external to you, correct?</p> <p>16 ATTORNEY TENNANT: Objection, form. Lack</p> <p>17 of foundation.</p> <p>18 <b>A There is an interesting phenomenon called</b></p> <p>19 <b>ventriloquism that actually can fool you into</b></p> <p>20 <b>thinking that your voice is coming from somewhere</b></p> <p>21 <b>else, and it's very easy to show that -- when you</b></p> <p>22 <b>say, "Do you think your voice," that involves</b></p> | <p style="text-align: right;">32</p> <p>1 ATTORNEY TENNANT: Objection. Lack of</p> <p>2 foundation.</p> <p>3 <b>A Generally binaural sound requires a system</b></p> <p>4 <b>to reproduce the signals -- the sound signals.</b></p> <p>5 <b>And so if I'm just listening with my ears, I hear</b></p> <p>6 <b>my voice with my -- with both of my ears, but it</b></p> <p>7 <b>doesn't fall under this category of binaural sound</b></p> <p>8 <b>system.</b></p> <p>9 Q So even though you hear your voice with</p> <p>10 both ears, as you've testified, it's not binaural,</p> <p>11 correct?</p> <p>12 ATTORNEY TENNANT: Objection.</p> <p>13 Mischaracterizes testimony. Lack of foundation.</p> <p>14 <b>A Binaural sound requires a way to create it</b></p> <p>15 <b>and a way to listen to it with headphones. And so</b></p> <p>16 <b>since there are no microphones involved to capture</b></p> <p>17 <b>it in this case, in this example, hypothetical</b></p> <p>18 <b>example, and I'm not wearing headphones, I would</b></p> <p>19 <b>not characterize this as binaural sound. It's</b></p> <p>20 <b>just natural sound.</b></p> <p>21 Q If you record your voice using two mics</p> <p>22 that are located in your ears, is the resulting --</p> |

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| <p>33</p> <p>1 the resulting recording binaural?</p> <p>2 <b>A The recording is binaural content that, if</b></p> <p>3 <b>played back over somebody wearing a headphone in</b></p> <p>4 <b>each ear, would be perceived as binaural sound.</b></p> <p>5 Q If you don't hear the sound as binaural,</p> <p>6 how come recording it with two mics is binaural?</p> <p>7 ATTORNEY TENNANT: Objection. Form.</p> <p>8 <b>A I don't understand. If I don't hear the</b></p> <p>9 <b>sound as binaural? What does -- I'm not sure what</b></p> <p>10 <b>you're referring to.</b></p> <p>11 Q Well, you testified earlier that it's --</p> <p>12 when you're just listening to your voice, you</p> <p>13 don't hear it as binaural, correct?</p> <p>14 <b>A Yes. You're referring to the natural</b></p> <p>15 <b>sound, just me speaking?</b></p> <p>16 Q Right.</p> <p>17 <b>A Right.</b></p> <p>18 Q And if you record your voice using two</p> <p>19 mics that are located in your ears, the recording</p> <p>20 of your voice cannot be binaural sound, correct?</p> <p>21 ATTORNEY TENNANT: Objection. Asked and</p> <p>22 answered.</p>                                                                                                                                                 | <p>35</p> <p>1 <b>But I assume that's a hypothetical.</b></p> <p>2 <b>So if somebody is going to listen to that</b></p> <p>3 <b>recording, then we have a binaural sound being</b></p> <p>4 <b>reproduced.</b></p> <p>5 Q Do the two mics capture your perspective</p> <p>6 of how you hear your voice?</p> <p>7 ATTORNEY TENNANT: Objection. Form.</p> <p>8 <b>A They do.</b></p> <p>9 Q And that perspective is not binaural for</p> <p>10 you, right?</p> <p>11 ATTORNEY TENNANT: Objection. Form.</p> <p>12 <b>A The word "binaural" only makes sense in a</b></p> <p>13 <b>recording and playback system. In the natural</b></p> <p>14 <b>world, we just go about our business hearing</b></p> <p>15 <b>sounds around us with our two ears. Only when we</b></p> <p>16 <b>record it and play it back over headphones,</b></p> <p>17 <b>presumably with the intent to recreate something,</b></p> <p>18 <b>is when it becomes binaural.</b></p> <p>19 Q So if this recording is played back for</p> <p>20 another person, how would they hear the voice in</p> <p>21 the recording?</p> <p>22 <b>A You're referring to the recording made</b></p>                                                                                                                                                 |
| <p>34</p> <p>1 <b>A It can and it is. That's the first part</b></p> <p>2 <b>of creating binaural sound, is to put microphones</b></p> <p>3 <b>in my ears or someone else's ears or a mannequin</b></p> <p>4 <b>and record.</b></p> <p>5 Q So how can the recording of it with two</p> <p>6 mics - the recording, not the playing back - be</p> <p>7 binaural?</p> <p>8 <b>A It is -- the microphones are capturing my</b></p> <p>9 <b>voice signals as they travel around my head and</b></p> <p>10 <b>reflect from my shoulders and enter through my</b></p> <p>11 <b>outer ears, and are picked up. So all of those --</b></p> <p>12 <b>all of that information is picked up by the</b></p> <p>13 <b>microphones in each ear, and now we have a</b></p> <p>14 <b>two-channel audio signal, a left and a right ear</b></p> <p>15 <b>microphone signal. That's binaural, assuming it's</b></p> <p>16 <b>played back over a binaural system, of course.</b></p> <p>17 Q And it's also binaural when it's recorded?</p> <p>18 ATTORNEY TENNANT: Objection. Asked and</p> <p>19 answered.</p> <p>20 <b>A That's not a tree falling in the forest,</b></p> <p>21 <b>if you -- if we record it and don't do anything</b></p> <p>22 <b>with it, then it's just a file of two signals.</b></p> | <p>36</p> <p>1 <b>with the microphones in my ears?</b></p> <p>2 Q Yes. Thank you.</p> <p>3 <b>A If they were to listen to it without any</b></p> <p>4 <b>other processing, just over headphones, they would</b></p> <p>5 <b>perceive me as being somewhere in the middle in</b></p> <p>6 <b>front of their face.</b></p> <p>7 <b>It depends on, again, whether -- I know we</b></p> <p>8 <b>excluded it before, but if I was in a room</b></p> <p>9 <b>speaking, then the microphones would also be</b></p> <p>10 <b>picking up my voice as it bounces around the room</b></p> <p>11 <b>and other characteristics. And so in that case,</b></p> <p>12 <b>it would recreate the room that I was in.</b></p> <p>13 Q Can you use this recording that we're</p> <p>14 talking about to synthesize binaural sound?</p> <p>15 ATTORNEY TENNANT: Objection, form. Lack</p> <p>16 of foundation.</p> <p>17 <b>A So this recording is a binaural sound</b></p> <p>18 <b>signal and it can be synthesized - by synthesized,</b></p> <p>19 <b>we mean, in this case, altered - to appear to come</b></p> <p>20 <b>from a different position. So I'm creating a new</b></p> <p>21 <b>binaural sound that somebody that would listen to</b></p> <p>22 <b>it would not think that I'm in front of them but</b></p> |

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| <p>37</p> <p>1 at some other direction.</p> <p>2 Q Okay. So you can use this recording to</p> <p>3 synthesize binaural sound, correct?</p> <p>4 ATTORNEY TENNANT: Objection. Asked and</p> <p>5 answered.</p> <p>6 A Correct. To clarify also, since I'm</p> <p>7 thinking about it, so synthesize means a lot of</p> <p>8 things. You can start with non-binaural and</p> <p>9 create binaural, or you can start with binaural,</p> <p>10 as we did in this case, and just synthesize a new</p> <p>11 direction for it. It's still binaural.</p> <p>12 Q So, thank you. Let's go back to</p> <p>13 Exhibit 1001, the patent.</p> <p>14 A Yes.</p> <p>15 Q And let's look at Claim 15, which is</p> <p>16 Column 44, Line 57. And just, you know, look at</p> <p>17 that, read it, and let me know when you're ready.</p> <p>18 A Okay. (Document review.)</p> <p>19 Okay.</p> <p>20 Q And I'm going to direct you specifically</p> <p>21 to the second limitation that starts with, "A</p> <p>22 second wearable electronic device."</p> | <p>39</p> <p>1 synthesis?</p> <p>2 ATTORNEY TENNANT: Objection. Form.</p> <p>3 A On its own, this limitation just says</p> <p>4 binaural voice is recorded and the person at the</p> <p>5 other end hears it. It doesn't talk about any</p> <p>6 kind of repositioning or anything.</p> <p>7 Q Okay. Well, can you look at the entire</p> <p>8 Claim 15 and tell me if any part of Claim 15</p> <p>9 implies binaural synthesis?</p> <p>10 ATTORNEY TENNANT: Same -- objection.</p> <p>11 Form.</p> <p>12 A I would say the last limitation that</p> <p>13 starts with, "A processor that executes the</p> <p>14 instructions to adjust the binaural voice," is</p> <p>15 talking about synthesis in the sense that it is</p> <p>16 intended to move to a different sound localization</p> <p>17 point.</p> <p>18 Q Okay. And that's binaural synthesis,</p> <p>19 correct?</p> <p>20 A That's not the only kind, but that is a</p> <p>21 kind of binaural synthesis, yes.</p> <p>22 Q Have you ever heard of the term</p> |
| <p>38</p> <p>1 Do you see that limitation?</p> <p>2 A I see it.</p> <p>3 Q And can you just read that into the</p> <p>4 record, just that limitation?</p> <p>5 A "A second wearable electronic device that</p> <p>6 a second person wears and that captures a binaural</p> <p>7 voice of the second person during an electronic</p> <p>8 phone call with the first wearable electronic</p> <p>9 device that the first person wears."</p> <p>10 Q Okay. And the clause in that claim</p> <p>11 limitation that says, "A second wearable</p> <p>12 electronic device that a second person wears and</p> <p>13 that captures a binaural voice of the second</p> <p>14 person," do you see that part of the claim</p> <p>15 limitation?</p> <p>16 A I see it, yes.</p> <p>17 Q Does this language imply binaural</p> <p>18 synthesis?</p> <p>19 ATTORNEY TENNANT: Objection. Form.</p> <p>20 A Just that part, no. It just implies</p> <p>21 binaural recording.</p> <p>22 Q Does this limitation imply binaural</p>                          | <p>40</p> <p>1 "psychoacoustic"?</p> <p>2 A Yes. And let's please make sure we write</p> <p>3 it as one word; otherwise, it has very bad</p> <p>4 connotations if the word "psycho" is by itself.</p> <p>5 Q So it's two -- it's one word,</p> <p>6 psychoacoustic?</p> <p>7 A It's one word, yes.</p> <p>8 Q I'm glad you told me that. Okay. So --</p> <p>9 I'm sorry, have you ever heard of the term</p> <p>10 "psychoacoustic," one word?</p> <p>11 A Yes. It's a big part of the course that I</p> <p>12 teach.</p> <p>13 Q What is it, high level?</p> <p>14 A Psychoacoustics is the science of studying</p> <p>15 how humans perceive various aspects of sound.</p> <p>16 Q So is it fair to say -- oh, go ahead,</p> <p>17 please.</p> <p>18 A No, high level. Sorry, I paused. High</p> <p>19 level. That's what it is at a high level.</p> <p>20 Q So would it be fair to say it's concerned</p> <p>21 with the psychology of how a person perceives</p> <p>22 sound?</p>                                      |

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| <p style="text-align: right;">41</p> <p>1     <b>A Some people have made the etymology of</b><br/>2 <b>this word relate to psychology, so, yes, it's how</b><br/>3 <b>we perceive sound can be related to psychology.</b><br/>4     Q Is it a different field than audio<br/>5 creation or audio signal processing?<br/>6     ATTORNEY TENNANT: Objection, form. Lack<br/>7 of foundation.<br/>8     <b>A Well, those are often interrelated. We</b><br/>9 <b>create audio by having knowledge of the</b><br/>10 <b>psychoacoustics of the listener or what we're</b><br/>11 <b>trying to achieve. So different methods are used</b><br/>12 <b>to understand one and to do the other, but they're</b><br/>13 <b>often not in isolation.</b><br/>14     Q So let me give you a hypothetical. If<br/>15 there is a picture -- so we're talking about you,<br/>16 and you're looking at a picture of a dog 10 feet<br/>17 away from you on the right. That looks like the<br/>18 left on the screen, but for me it was the right.<br/>19 So there is a picture of a dog that you're looking<br/>20 at, and the dog is 10 feet away from you on your<br/>21 right, and then your speakers play a dog barking<br/>22 noise right now on this call. Okay?</p> | <p style="text-align: right;">43</p> <p>1     <b>A Because the dog is at a further distance</b><br/>2 <b>than my speakers - which I assume is part of this</b><br/>3 <b>hypothetical, my computer is at one foot, the dog</b><br/>4 <b>is at 10 feet - it would be difficult, unless some</b><br/>5 <b>processing was done to the dog bark coming out of</b><br/>6 <b>the speakers, to give it a sense of distance.</b><br/>7     Q Could the picture help with the perception<br/>8 that the sound was coming from the picture of the<br/>9 dog instead of just your speakers?<br/>10     ATTORNEY TENNANT: Objection. Calls for<br/>11 speculation.<br/>12     <b>A If -- if it's within the range of how</b><br/>13 <b>people fuse picture and sound, there is an angular</b><br/>14 <b>range that people -- the average person uses</b><br/>15 <b>beyond which it would be -- the answer would be</b><br/>16 <b>no. And inside of that, the answer would be, it's</b><br/>17 <b>possible.</b><br/>18     <b>But if you're going to ask me what that</b><br/>19 <b>angle range is, it's hard to answer. Because it's</b><br/>20 <b>completely dependent on the individual.</b><br/>21     Q Okay. So what I think you're saying, and<br/>22 correct me if I'm wrong, there is some angle that</p> |
| <p style="text-align: right;">42</p> <p>1     <b>A Okay.</b><br/>2     Q Is it possible that the dog picture helps<br/>3 you to perceive that the barking sound is coming<br/>4 from the dog picture?<br/>5     ATTORNEY TENNANT: Objection, form. Lack<br/>6 of foundation. Calls for speculation.<br/>7     <b>A So the speakers of my computer are playing</b><br/>8 <b>the dog sound? Is that what you're saying?</b><br/>9     Q Yes. Yes.<br/>10    <b>A Okay. The answer is, it depends on the</b><br/>11 <b>listener, how trained or untrained they are, and</b><br/>12 <b>how far off in angle the picture of the dog is</b><br/>13 <b>from where my speakers are.</b><br/>14    Q Okay. So is there a scenario where it<br/>15 could help -- where, if the dog is 10 feet away,<br/>16 that by seeing the picture -- I'm sorry, the<br/>17 picture of the dog is 10 feet away, and so by<br/>18 seeing the picture of the dog, there are persons<br/>19 who would perceive the barking sound that's coming<br/>20 from your speakers as actually coming from the<br/>21 picture of the dog?<br/>22    ATTORNEY TENNANT: Same objections.</p>                                                                                                  | <p style="text-align: right;">44</p> <p>1 the picture is at, or range that the picture is<br/>2 from the speakers themselves, that -- that --<br/>3 where persons might attribute the sound from your<br/>4 speakers as coming from the picture of the dog?<br/>5     ATTORNEY TENNANT: Objection.<br/>6 Mischaracterizes the testimony.<br/>7     <b>A The system could be carefully designed to</b><br/>8 <b>do that and fool some people. But I can't say if</b><br/>9 <b>it would be everyone.</b><br/>10    Q Okay. Let me just try to find something.<br/>11 Give me one minute. Okay.<br/>12    ATTORNEY PARTRIDGE: Homayoon, can you --<br/>13 do you have -- I apologize. You said you have the<br/>14 exhibits.<br/>15    Can you pull up our -- oh, okay.<br/>16 Homayoon, can you put Exhibit 2029 in the chat,<br/>17 please.<br/>18    Q And Dr. K, can you just tell me when you<br/>19 have that exhibit.<br/>20    <b>A Okay. I'm downloading it right now.</b><br/>21    <b>I have it.</b><br/>22    ATTORNEY TENNANT: Counsel, is this a new</p>                                                                                                                                                                                                                                  |

Transcript of Dr. Chris Kyriakakis  
Conducted on August 23, 2024

12 (45 to 48)

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| <p style="text-align: right;">45</p> <p>1 exhibit that's of record -- not of record?</p> <p>2 ATTORNEY PARTRIDGE: This is the</p> <p>3 transcript of Dr. Gregory Welch that was taken in</p> <p>4 Meta Platforms versus Eight kHz in the PTAB. And</p> <p>5 I would like -- first I would like to mark this as</p> <p>6 Exhibit 2029, please.</p> <p>7 (Exhibit 2029, Transcript of Dr. Gregory</p> <p>8 F. Welch, marked for identification.)</p> <p>9 ATTORNEY TENNANT: I'll object to this</p> <p>10 exhibit as outside the scope of this deposition.</p> <p>11 New evidence is not permitted after replies. It's</p> <p>12 a standing objection, so I won't repeat it with</p> <p>13 further questioning.</p> <p>14 ATTORNEY PARTRIDGE: Thank you. I</p> <p>15 appreciate it, Mr. Tennant. And of course you'll</p> <p>16 have the standing objection.</p> <p>17 So did we get that marked? I just didn't</p> <p>18 hear the videographer or whoever is marking these</p> <p>19 exhibits.</p> <p>20 THE EXHIBIT TECHNICIAN: Yes, we can have</p> <p>21 it marked.</p> <p>22 ATTORNEY PARTRIDGE: Thank you. And do I</p> | <p style="text-align: right;">47</p> <p>1 transcript?</p> <p>2 <b>A Right. The PDF file goes up to Page 153.</b></p> <p>3 Q You know, I apologize. Let's go first to</p> <p>4 Page 47 of the -- wait, let me see. Page 47 of</p> <p>5 the PDF file, this condensed version. So I was</p> <p>6 talking to you about the transcript numbered page.</p> <p>7 <b>A Okay. At the bottom right it</b></p> <p>8 <b>says, "Page 47."</b></p> <p>9 Q Okay. And at the top of that page -- just</p> <p>10 a second. Let me make sure.</p> <p>11 ATTORNEY PARTRIDGE: Can we take just one</p> <p>12 second to go off the record, please? I want to</p> <p>13 make sure I'm getting you to the right page in</p> <p>14 this deposition. Okay?</p> <p>15 ATTORNEY TENNANT: Jayme, do you want to</p> <p>16 take a break? We've been going for about an hour.</p> <p>17 Will that give you time?</p> <p>18 ATTORNEY PARTRIDGE: Sure. That would be</p> <p>19 great.</p> <p>20 THE VIDEOGRAPHER: Okay. We are going off</p> <p>21 the record. The time is 1:02.</p> <p>22 (Recess.)</p>                                     |
| <p style="text-align: right;">46</p> <p>1 need to wait or are we good with this?</p> <p>2 THE EXHIBIT TECHNICIAN: No, you may</p> <p>3 continue. I can have them marked at the end.</p> <p>4 Q Okay. And Dr. Kyriakakis, can -- can you</p> <p>5 go to -- this is the deposition of</p> <p>6 Dr. Gregory Welch. Have you ever heard of him?</p> <p>7 <b>A I have not.</b></p> <p>8 Q Okay. Well, I will represent to you that</p> <p>9 Dr. Welch was retained as an expert in the</p> <p>10 parallel IPR proceedings between Eight kHz and</p> <p>11 Meta Platforms. Okay?</p> <p>12 <b>A Retained by? Eight --</b></p> <p>13 Q Meta.</p> <p>14 <b>A Retained by Meta. Okay.</b></p> <p>15 Q Okay.</p> <p>16 <b>A Okay.</b></p> <p>17 Q And some -- I would like to direct your</p> <p>18 attention to -- can you go to Page 183 of the</p> <p>19 deposition transcript, please.</p> <p>20 <b>A The file goes to Page 153. Or do you</b></p> <p>21 <b>mean...</b></p> <p>22 Q Do you see Page 183 of the deposition</p>                                                                                                     | <p style="text-align: right;">48</p> <p>1 THE VIDEOGRAPHER: We are back on the</p> <p>2 record. The time is 1:13.</p> <p>3 Q Okay. Dr. K, we were looking at what's</p> <p>4 marked as Exhibit 2029 before the break, right?</p> <p>5 <b>A Yes.</b></p> <p>6 Q So what I want to direct your attention to</p> <p>7 is, it's Page 30 of the PDF at the bottom, or the</p> <p>8 transcript -- well, it's not the transcript. It's</p> <p>9 Page 30 of the PDF.</p> <p>10 <b>A Okay.</b></p> <p>11 Q And do you see up in the top left that</p> <p>12 that is Page 113?</p> <p>13 <b>A On the top right, yes.</b></p> <p>14 Q Okay. And I want you to look at Page 113,</p> <p>15 and I'd like you to read from Line 1 -- Page 113,</p> <p>16 beginning at Line 4, okay, with that question, and</p> <p>17 read through Page 114, Line 20 for me.</p> <p>18 <b>A Okay.</b></p> <p>19 ATTORNEY TENNANT: Counsel, we'd like to</p> <p>20 object to the admissibility of this evidence for</p> <p>21 many reasons, as I indicated before, including for</p> <p>22 hearsay. It's also outside the scope, as new</p> |

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Page 13

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| <p style="text-align: right;">49</p> <p>1 evidence is not permitted. That would be a<br/>2 standing objection -- objections. Excuse me.<br/>3 ATTORNEY PARTRIDGE: Thank you,<br/>4 Mr. Tennant.<br/>5 Q So read that, and then I'm going to be ask<br/>6 you a few questions before we talk about this.<br/>7 <b>A Okay. I'm reading it now.</b><br/>8 (Document review.)<br/>9 Okay. I read it.<br/>10 Q And let me go back first and set it up a<br/>11 little bit. Do you remember when we were talking<br/>12 about the dog hypothetical?<br/>13 <b>A Yes.</b><br/>14 Q And we were talking about where the dog is<br/>15 10 feet away, and we talked about that the sound<br/>16 originated from your speakers, okay?<br/>17 <b>A Yes.</b><br/>18 Q So the sound does not actually originate<br/>19 with the dog picture, right?<br/>20 ATTORNEY TENNANT: Objection to form.<br/>21 Foundation.<br/>22 <b>A If you mean physically, no.</b></p>                                                                                                                                   | <p style="text-align: right;">51</p> <p>1 <b>context. So I don't know what happened before or</b><br/>2 <b>after, but I generally read those two pages that</b><br/>3 <b>you mentioned.</b><br/>4 Q Okay. And let me ask you about the part<br/>5 where -- can we start on Page 113, Line 16?<br/>6 <b>A Okay.</b><br/>7 Q And I'm going through Line 21. And can<br/>8 you read that passage into the record, please.<br/>9 <b>A Starting from the sentence that starts</b><br/>10 <b>with, "People"?</b><br/>11 Q Yes. And then ending at the end of the<br/>12 sentence on Line 21.<br/>13 <b>A "People can perceive things for a variety</b><br/>14 <b>of different reasons, including if you show me a</b><br/>15 <b>picture of a dog and I hear barking. I can</b><br/>16 <b>perceive that sound as coming from that location,</b><br/>17 <b>whether or not the sound accurately represents</b><br/>18 <b>that."</b><br/>19 Q Do you agree with that portion of<br/>20 Dr. Welch's testimony?<br/>21 ATTORNEY TENNANT: Objection. Calls for<br/>22 speculation.</p> |
| <p style="text-align: right;">50</p> <p>1 Q But with the help of a dog picture, the<br/>2 dog picture we talked about, you can perceive it<br/>3 as coming, as originating from the dog picture,<br/>4 correct?<br/>5 ATTORNEY TENNANT: Objection to form.<br/>6 <b>A I just want to make it clear that that's</b><br/>7 <b>not a general rule. Some people, under the right</b><br/>8 <b>circumstances, with the dog picture being at</b><br/>9 <b>certain angles relative to the sound, may, but</b><br/>10 <b>it's not a guaranteed thing.</b><br/>11 Q Okay. But those persons would perceive<br/>12 the sound as originating from the dog picture,<br/>13 correct?<br/>14 ATTORNEY TENNANT: Objection to form.<br/>15 Foundation.<br/>16 <b>A It's possible that that could happen under</b><br/>17 <b>those circumstances.</b><br/>18 Q Okay. And so did you -- I know you read<br/>19 Dr. Welch's testimony. Do you want to read it<br/>20 again or are you good? I'm going to ask you a<br/>21 question about it.<br/>22 <b>A I read it, it's just -- it's very out of</b></p> | <p style="text-align: right;">52</p> <p>1 <b>A I think it matches generally with the</b><br/>2 <b>limitations that I spoke about. I think it's --</b><br/>3 <b>he's giving a similar answer.</b><br/>4 Q Okay. I think I know the answer to this,<br/>5 but would you consider yourself an expert in the<br/>6 field of psychoacoustics?<br/>7 ATTORNEY TENNANT: Objection. Asked and<br/>8 answered.<br/>9 Q Psychoacoustics?<br/>10 <b>A Yes. As I mentioned, that's a big part of</b><br/>11 <b>what I teach at the university.</b><br/>12 Q Okay. Thank you.<br/>13 Does your field of expertise also<br/>14 encompass audio signal processing and audio<br/>15 creation?<br/>16 <b>A Yes, it does.</b><br/>17 Q And so give me -- I know you know all this<br/>18 stuff and you're very accomplished, but if you<br/>19 were giving me a general high level description of<br/>20 your field of expertise, what is that exactly?<br/>21 <b>A My overall field of expertise, like</b><br/>22 <b>everything? Or just the categories you asked</b></p>                  |

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| <p>53</p> <p>1 about?</p> <p>2 Q Give me your overall field and then we</p> <p>3 might break it down.</p> <p>4 A The way I describe my field is, my</p> <p>5 expertise is at the intersection of acoustics,</p> <p>6 auto signal processing, and psychoacoustics. And</p> <p>7 so algorithms that are informed by what happens</p> <p>8 to sort of the -- that's the -- algorithms is the</p> <p>9 signal processing part, and that are informed by</p> <p>10 what sound -- what happens to sound in various</p> <p>11 environments, that's the acoustics part, and how</p> <p>12 it is perceived by listeners, and that's the</p> <p>13 psychoacoustics part.</p> <p>14 Q So does the '090 patent, the one that is</p> <p>15 at issue and we're talking about today, does that</p> <p>16 concern psychoacoustics?</p> <p>17 A One aspect of it, the -- the ability to</p> <p>18 detect -- or to perceive sound from certain</p> <p>19 directions. There are many aspects of</p> <p>20 psychoacoustics, but that's one of them.</p> <p>21 Q So is it your opinion that to understand</p> <p>22 this patent, the '090 patent, that a person having</p> | <p>55</p> <p>1 A Yes, I have it.</p> <p>2 Q Okay. You're at Claim 1. Can you review</p> <p>3 that claim, please, and I'll just ask you a few</p> <p>4 questions about it.</p> <p>5 A Okay. (Document review.)</p> <p>6 Okay.</p> <p>7 Q Does that claim, Claim 1 of the '090</p> <p>8 patent, talk about providing sound or perception</p> <p>9 of sound?</p> <p>10 ATTORNEY TENNANT: Objection. Lack of</p> <p>11 foundation. Form.</p> <p>12 A It looks like it's both.</p> <p>13 Q Where in that claim is it describing</p> <p>14 perception of sound? And I'm sorry, excuse me.</p> <p>15 I'm talking about the same one, in the '090</p> <p>16 patent. Excuse me.</p> <p>17 ATTORNEY TENNANT: Objection. Form.</p> <p>18 A One part is in the last limitation, where</p> <p>19 it says -- well, I'll just read it: "Providing</p> <p>20 with an electronic earphone located at the head of</p> <p>21 the listening person the binaural sound to the</p> <p>22 listening person during the telephone call, such</p>                                                                                                                           |
| <p>54</p> <p>1 ordinary skill in the art should be knowledgeable</p> <p>2 about psychoacoustics?</p> <p>3 A I don't know if they have to be</p> <p>4 knowledgeable about every single aspect of</p> <p>5 psychoacoustics, but the part that has to do with</p> <p>6 sound localization is relevant to this patent.</p> <p>7 Q So the part of psychoacoustics that has to</p> <p>8 do with sound localization is relevant to the '090</p> <p>9 patent?</p> <p>10 A That's what I said, yes.</p> <p>11 Q Okay. And a person having ordinary skill</p> <p>12 in the art to interpret this patent should at</p> <p>13 least be knowledgeable in the area of</p> <p>14 psychoacoustics that has to do with sound</p> <p>15 localization?</p> <p>16 ATTORNEY TENNANT: Objection, form. Lack</p> <p>17 of foundation.</p> <p>18 A Correct.</p> <p>19 Q Thank you.</p> <p>20 Okay. Can I direct your attention back to</p> <p>21 Claim 1 of the '090 patent, and that is</p> <p>22 Exhibit 1001.</p>                                                                                                                                                          | <p>56</p> <p>1 that the origin of the binaural sound for the</p> <p>2 listening person occurs at the sound localization</p> <p>3 point in empty space that is away from and</p> <p>4 proximate to the listening person."</p> <p>5 So that implies that the person is hearing</p> <p>6 it in empty space at a certain location, and away</p> <p>7 from and proximate, which is perception.</p> <p>8 (Reporter clarification.)</p> <p>9 A At a certain location and empty space that</p> <p>10 is away from and proximate.</p> <p>11 Q That limitation itself is talking about</p> <p>12 providing the sound, correct?</p> <p>13 ATTORNEY TENNANT: Objection.</p> <p>14 Mischaracterizes testimony.</p> <p>15 Q And I apologize. When I say "that</p> <p>16 limitation," I'm talking about the limitation that</p> <p>17 starts with, "Providing with an electronic</p> <p>18 earphone located at the head of the listening</p> <p>19 person," that last limitation of Claim 1. That is</p> <p>20 talking about providing a sound, correct?</p> <p>21 A It's talking about both, providing and</p> <p>22 perception by the person receiving it.</p> |

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| <p>57</p> <p>1 Q Okay. You can put that away for a minute.</p> <p>2 <b>A Okay.</b></p> <p>3 Q You don't have to put it too far away,</p> <p>4 but --</p> <p>5 <b>A Okay. It's on the other monitor.</b></p> <p>6 Q Is there any difference between stereo</p> <p>7 sound and binaural sound?</p> <p>8 ATTORNEY TENNANT: Objection. Lack of</p> <p>9 foundation.</p> <p>10 <b>A Yes, there is.</b></p> <p>11 Q Do you agree that a person without hearing</p> <p>12 impairment -- I apologize. Strike that.</p> <p>13 Do you agree that for a person without</p> <p>14 hearing impairment -- impairment, both stereo and</p> <p>15 binaural sounds can be heard with two ears?</p> <p>16 ATTORNEY TENNANT: Objection. Form.</p> <p>17 <b>A All sounds can be heard with two ears,</b></p> <p>18 <b>so -- including binaural and stereo.</b></p> <p>19 Q Do you agree that for stereo sound, you</p> <p>20 will need -- to hear stereo sound, you will need</p> <p>21 to have two speakers, with a signal going to the</p> <p>22 left speaker and a signal going to the right</p>                                                     | <p>59</p> <p>1 yes, if stereo sound is played back over loud</p> <p>2 speakers that are 10 feet away from a listener, is</p> <p>3 the listener being provided binaural sound?</p> <p>4 ATTORNEY TENNANT: Objection.</p> <p>5 Mischaracterizes the testimony.</p> <p>6 <b>A No, I think we need to clarify what we</b></p> <p>7 <b>mean with -- by "stereo sound." I was speaking of</b></p> <p>8 <b>two channels of audio that can be stereo sound</b></p> <p>9 <b>because it was recorded that way, in a studio, for</b></p> <p>10 <b>example, for music, or two channels of audio that</b></p> <p>11 <b>took a stereo recording and were processed so that</b></p> <p>12 <b>when they play out of the loud speakers, the</b></p> <p>13 <b>listener perceives it as binaural sound.</b></p> <p>14 Q So in the first scenario that you gave</p> <p>15 me -- are you with me?</p> <p>16 <b>A Yes.</b></p> <p>17 Q Would a listener perceive that -- or would</p> <p>18 you say that the listener is provided binaural</p> <p>19 sound?</p> <p>20 <b>A In the first scenario, where the signal is</b></p> <p>21 <b>a stereo -- classic stereo signal, two channels,</b></p> <p>22 <b>the answer is, no, it's not binaural.</b></p> |
| <p>58</p> <p>1 speaker?</p> <p>2 ATTORNEY TENNANT: Objection. Form.</p> <p>3 <b>A A different signal to the left and to the</b></p> <p>4 <b>right speaker, yes.</b></p> <p>5 Q If a stereo sound is played back over loud</p> <p>6 speakers that are 10 feet away from a listener,</p> <p>7 would you say that the listener is provided</p> <p>8 binaural sound?</p> <p>9 ATTORNEY TENNANT: Objection, form. Lack</p> <p>10 of foundation.</p> <p>11 <b>A It depends on the signals that are being</b></p> <p>12 <b>played from the loud speakers.</b></p> <p>13 Q So what does that mean, "It depends on the</p> <p>14 signals that are being played from the loud</p> <p>15 speakers"?</p> <p>16 <b>A As I wrote in my response document that I</b></p> <p>17 <b>found recently, there are ways to make loud</b></p> <p>18 <b>speakers reproduce binaural sound, even if they're</b></p> <p>19 <b>not up against the ears of the listener. And so</b></p> <p>20 <b>it's possible to achieve binaural sound from loud</b></p> <p>21 <b>speakers using those methods.</b></p> <p>22 Q So if stereo sounds -- so your answer is,</p> | <p>60</p> <p>1 Q So if classic stereo sound is played back</p> <p>2 over loud speakers that are two meters away from a</p> <p>3 listener, would you say that the listener is</p> <p>4 provided binaural sound?</p> <p>5 ATTORNEY TENNANT: Objection, form. Lack</p> <p>6 of foundation.</p> <p>7 <b>A The same answer as before. The distance</b></p> <p>8 <b>10 to two meters won't make any difference.</b></p> <p>9 Q Okay. So the answer is no?</p> <p>10 <b>A It will not be binaural sound if the</b></p> <p>11 <b>signal is classic stereo.</b></p> <p>12 Q Okay. And again, if that -- if the sound</p> <p>13 is 10 centimeters away, I assume you would have</p> <p>14 the same answer?</p> <p>15 <b>A Ten centimeters?</b></p> <p>16 Q So the classic stereo sound is played back</p> <p>17 over a live -- on loud speakers that are 10</p> <p>18 centimeters away from a listener, you would the</p> <p>19 listener is being provided a binaural sound?</p> <p>20 ATTORNEY TENNANT: Objection to form.</p> <p>21 Lack of foundation.</p> <p>22 <b>A Now we're getting to a distance where</b></p>                                                                                                                     |

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| <p>61</p> <p>1 things might get a little tricky because the head<br/>2 of the listener might produce some shadowing from<br/>3 the opposite side loud speaker. And so as we get<br/>4 closer to the head, it's -- it would be -- the<br/>5 signal that the speak -- that the listener<br/>6 perceives may not be classic stereo.</p> <p>7 Q And why is that?</p> <p>8 A Because stereo from loud speakers relies<br/>9 on the fact that each loud speaker is delivering<br/>10 signal to both ears. And so there are four paths,<br/>11 two from each speaker. We can think of it that<br/>12 way. But as the speakers get closer to the head,<br/>13 the cross paths, especially at the higher<br/>14 frequencies, start to get blocked by the physical<br/>15 presence of the barrier of the head. And so it<br/>16 starts to change.</p> <p>17 Q And where does it start to change?</p> <p>18 A It depends on the distance and the size of<br/>19 the person's head. As we know, some have bigger<br/>20 than others.</p> <p>21 Q Yes, definitely know that.</p> <p>22 So again, let me just -- so if the stereo</p> | <p>63</p> <p>1 So if the guitar player is 10 meters away<br/>2 way from two mics that record in stereo the song<br/>3 being played on the guitar.</p> <p>4 A Okay.</p> <p>5 Q Okay. And then the recorded sound is<br/>6 being played over the loud speakers for a<br/>7 listener, can the listener determine that the<br/>8 guitar was 10 meters away from the mic to the<br/>9 left?</p> <p>10 ATTORNEY TENNANT: Objection to form. And<br/>11 lack of foundation.</p> <p>12 A I don't know if the listener could give<br/>13 you an exact distance, but when compared to the<br/>14 two meters, which was the part of the previous<br/>15 hypothetical, a listener could definitely say that<br/>16 the second recording was closer than the first<br/>17 recording.</p> <p>18 Q But the listener couldn't tell that the<br/>19 guitar was 10 meters away from the mic to the<br/>20 left, correct?</p> <p>21 ATTORNEY TENNANT: Objection. Asked and<br/>22 answered.</p>                                                                 |
| <p>62</p> <p>1 sound is played back over loud speakers that are<br/>2 two meters away from a listener, would you say<br/>3 that the listener is provided binaural sound?</p> <p>4 ATTORNEY TENNANT: Objection. Asked and<br/>5 answered.</p> <p>6 A With no additional processing and just<br/>7 classic stereo, the answer is no.</p> <p>8 Q Okay. So let's go to another<br/>9 hypothetical. If a guitar player is 10 meters<br/>10 away from the microphone to the left that<br/>11 records -- and the microphone is recording in<br/>12 classic stereo, the song that's being played on<br/>13 the guitar, okay?</p> <p>14 A I'm sorry, did you say the microphone<br/>15 or...</p> <p>16 Q I'm sorry. So a guitar player is<br/>17 10 meters away from the mic to the left, and the<br/>18 mic is recording in stereo the song that's played<br/>19 on the guitar.</p> <p>20 A Well, you can't record stereo with a<br/>21 single mic.</p> <p>22 Q Okay. Let me see. Let me...</p>                                                                                                                                 | <p>64</p> <p>1 A Judging exact distance is a very difficult<br/>2 task for human listeners. We are generally<br/>3 better -- much better at relative, closer, medium,<br/>4 far, far, but not exact distance.</p> <p>5 Q Okay. So the answer is no, correct?</p> <p>6 A The listener cannot tell you the exact<br/>7 number.</p> <p>8 Q So would a listener be able to perceive<br/>9 the location of the original sound source if the<br/>10 sound source is playing classic stereo sound from<br/>11 the loud speakers?</p> <p>12 ATTORNEY TENNANT: Objection, form. Lack<br/>13 of foundation.</p> <p>14 A We're talking about the scenario now there<br/>15 is a guitar player and there are microphones, and<br/>16 it's at some distance from the microphones, and<br/>17 then those two signals are being played from loud<br/>18 speakers and the listener is listening to that.<br/>19 I'm just --</p> <p>20 Q Correct.</p> <p>21 A -- putting myself in that position. Okay.</p> <p>22 There are certain parts of the location</p> |

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| <p>65</p> <p>1 that the listener could certainly discern, for<br/>2 example, the left-right -- I mean, how far off<br/>3 they are from the left or the right of center.<br/>4 Q But would the listener be able to<br/>5 determine the actual location of the original<br/>6 sound source?<br/>7 ATTORNEY TENNANT: Objection. Form.<br/>8 A It depends to what's -- in what accuracy<br/>9 we're trying to find the location. The listener<br/>10 would say -- would perceive that the source is far<br/>11 and just to the left of center, so...<br/>12 Q Would the listener be able to tell if --<br/>13 that the guitar was 10 meters away from the mic?<br/>14 ATTORNEY TENNANT: Excuse me. I think<br/>15 Chris was continuing to answer, and then you<br/>16 asked --<br/>17 ATTORNEY PARTRIDGE: I'm sorry.<br/>18 Q I'm sorry, Dr. K.<br/>19 A I'm -- it's okay. I don't know what I<br/>20 was -- I'm just saying, so it's not -- as I said<br/>21 before, it's -- it's not really easy for -- some<br/>22 listeners are very good at it. It's just</p> | <p>67</p> <p>1 A Okay. Okay.<br/>2 Q And do you see that Dr. Welch testified<br/>3 that stereo sound played over loud speakers would<br/>4 be considered as stereo, not binaural audio?<br/>5 A That's what he said here --<br/>6 ATTORNEY TENNANT: Objection -- objection<br/>7 to form. Relevance.<br/>8 A That's what Dr. Welch is saying in this<br/>9 passage. I was just glancing at the pages before<br/>10 it as I was trying to find this. He's also aware<br/>11 that there are methods to make it binaural, but in<br/>12 this passage he's saying it's just stereo.<br/>13 Q Okay. And do you also see that Dr. Welch<br/>14 testified that, "No one would be able to perceive<br/>15 the, say, true or a specific or accurate location,<br/>16 spacial location, of anything from those<br/>17 speakers."<br/>18 Do you see where he testified to that?<br/>19 ATTORNEY TENNANT: Objection to form. And<br/>20 hearsay.<br/>21 A Well, he said that sentence. But then,<br/>22 going on, he says, "They would hear left and right</p> |
| <p>66</p> <p>1 generally not very easy to determine the exact<br/>2 distance. So if that's part of location -- we're<br/>3 in a hypothetical, so we don't really have<br/>4 requirements for accuracy. Is it down to the<br/>5 one-millionth of a millimeter or is it in that<br/>6 direction sitting in that chair? Probably yes.<br/>7 Q Let me go back, please, to the deposition<br/>8 of Dr. Welch, Exhibit 2029. And just a minute,<br/>9 I'll give you the cite to it.<br/>10 A Okay. I have it.<br/>11 ATTORNEY TENNANT: For the record, the<br/>12 same standing objections to this exhibit and the<br/>13 line of questioning that may follow.<br/>14 Q Give me a second. I'm sorry, I got lost<br/>15 in my own thing. Just give me a second.<br/>16 A No problem.<br/>17 Q Okay. We're on Exhibit 2029, and can you<br/>18 go to transcript page 87, which is Page 23 of the<br/>19 PDF.<br/>20 A Yes, I see it.<br/>21 Q And can you read to yourself Page 87,<br/>22 Line 18, through Page 88, Line 18, please.</p>                              | <p>68</p> <p>1 and some spacial component of that that's limited<br/>2 by what can be perceptually achieved from those<br/>3 speakers."<br/>4 So he's implying that other positions in<br/>5 between left and right can be perceived.<br/>6 Q But he also said that, "No one would be<br/>7 able to perceive the, say, true or specific or<br/>8 accurate location, spacial location, of anything<br/>9 with those speakers."<br/>10 Do you see that?<br/>11 A I see it. I don't agree with it.<br/>12 Q Okay. So why don't you agree with him?<br/>13 A Because having been involved in the<br/>14 creation of stereo sound, it's generally known<br/>15 that it's possible to create, through standard<br/>16 techniques, the impression of sounds coming from<br/>17 specific locations between the loud speakers, at<br/>18 angles between the loud speakers and at different<br/>19 distances.<br/>20 Q Okay. So you disagree with Dr. Welch's<br/>21 testimony?<br/>22 A With that sentence. He kind of qualifies</p>                        |

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| <p>69</p> <p>1 <b>it better in the last sentence, and so, I would go</b><br/>2 <b>with what I just said as my opinion.</b><br/>3 Q Okay. So you disagree with Dr. Welch?<br/>4 ATTORNEY TENNANT: Objection. Asked and<br/>5 answered twice.<br/>6 <b>A I disagree with that particular sentence,</b><br/>7 <b>11 -- Line 11 through 15. But the whole</b><br/>8 <b>paragraph, when read together, seems to match what</b><br/>9 <b>I said before.</b><br/>10 Q Okay. And again, can stereo sound allow<br/>11 you to determine the location of the sound source?<br/>12 ATTORNEY TENNANT: Objection. Asked and<br/>13 answered.<br/>14 <b>A It's possible to do that with stereo</b><br/>15 <b>sound, yes.</b><br/>16 Q Can you -- I want to introduce -- just one<br/>17 second.<br/>18 ATTORNEY PARTRIDGE: I want to introduce<br/>19 Exhibit 2030. And this is not in the record, so<br/>20 Homayoon, are you going to put that in the chat?<br/>21 (Exhibit 2030, Transcript of Dr. Agnieszka<br/>22 Roginska, marked for identification.)</p> | <p>71</p> <p>1 IPRs 1019 and 1020. Okay?<br/>2 <b>A Okay.</b><br/>3 Q And can you look at - I may have asked you<br/>4 this - Page 66, Line 5, through Page 67, Line 3.<br/>5 <b>A Okay. I'll read it.</b><br/>6 Q Thank you.<br/>7 <b>A (Document review.)</b><br/>8 <b>Okay.</b><br/>9 Q And do you see that Dr. Roginska testified<br/>10 that -- and it's at the top. It's on Page 67 that<br/>11 Dr. Roginska testified that, "Stereo sound will<br/>12 not allow you to position the sound in a<br/>13 three-dimensional space."<br/>14 <b>A I see that.</b><br/>15 Q Do you disagree with this testimony by<br/>16 Dr. Roginska?<br/>17 <b>A I'm reading it out of context, so I'm not</b><br/>18 <b>sure what she means by three-dimensional space.</b><br/>19 <b>But it's quite well known that you can place sound</b><br/>20 <b>sources using stereo at different positions in</b><br/>21 <b>space so that a listener perceives them that way.</b><br/>22 <b>So I'm not quite sure what she's referring to.</b></p>                                                       |
| <p>70</p> <p>1 Q Do you see that in the chat,<br/>2 Dr. Kyriakakis?<br/>3 <b>A Yes. I'm downloading it now.</b><br/>4 <b>I have it.</b><br/>5 Q Okay. And for the record, Exhibit 2030 is<br/>6 the deposition of Dr. Roginska, and this was in<br/>7 IPR -- in IPR 2023-1019 and 1020, and it's dated<br/>8 February 27th, 2024.<br/>9 ATTORNEY TENNANT: We object to the<br/>10 admissibility of this evidence. It's outside of<br/>11 the scope of the deposition, it's improper<br/>12 hearsay, and it's outside the scope of the<br/>13 proceeding. It's also being brought in after the<br/>14 reply has been filed, and new evidence is not<br/>15 permitted after that time.<br/>16 Standing objection, and the line of<br/>17 questioning that follows would apply to all.<br/>18 Q And can you turn to Page 66, which is<br/>19 Page 18 of the PDF.<br/>20 <b>A Yes.</b><br/>21 Q And I will represent to you that<br/>22 Dr. Roginska testified for Meta Platforms in the</p>                                                           | <p>72</p> <p>1 Q So you disagree with this testimony by<br/>2 Dr. Roginska?<br/>3 ATTORNEY TENNANT: Objection to form.<br/>4 <b>A With no other context, I -- I am</b><br/>5 <b>personally familiar with methods that don't agree</b><br/>6 <b>with this, so I would have to disagree.</b><br/>7 Q Do you agree that one would need binaural<br/>8 sound in order to externalize the sound so that<br/>9 the origin of the sound is located at a distance<br/>10 of, say, five meters from the listener?<br/>11 ATTORNEY TENNANT: Objection to form.<br/>12 Lack of foundation. Incomplete hypothetical.<br/>13 <b>A No, binaural sound is not required. I'm</b><br/>14 <b>perceiving you at about the distance of, if I move</b><br/>15 <b>back, two meters, and we're not using binaural</b><br/>16 <b>sound. So I don't think binaural sound is</b><br/>17 <b>required.</b><br/>18 Q Okay. Let me -- can you please turn to<br/>19 Exhibit -- the same Exhibit 2030, the testimony of<br/>20 Dr. Roginska.<br/>21 <b>A Okay.</b><br/>22 Q And I will direct your attention to</p> |

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| <p style="text-align: right;">73</p> <p>1 Page -- so this is Page 35 of the -- just one<br/>2 second.<br/>3 I'm sorry, so can we start on -- at<br/>4 Page 124 of the transcript, so this is Page 32.<br/>5 And I direct your attention to Page 124 of the<br/>6 transcript, Lines 20 through 22. The question<br/>7 starts at Line 17, so Line 17 through 22.<br/>8 ATTORNEY TENNANT: Same standing<br/>9 objections to Exhibit 2030 as before.<br/>10 <b>A Just before I read it, the Claim 1 that's</b><br/>11 <b>being referred to here in Line 18, is that the</b><br/>12 <b>'090 patent we're talking about?</b><br/>13 Q That's not the '090 patent, but I'll ask<br/>14 you a general question after this. So if you'll<br/>15 just read this testimony.<br/>16 <b>A Okay.</b><br/>17 Q Are you ready?<br/>18 <b>A I'm ready.</b><br/>19 Q So do you agree with Dr. Roginska that to<br/>20 externalize a sound, you need HRTF processing and<br/>21 you need binaural sound in order to externalize<br/>22 the sound?</p>                                                                                                                                                                             | <p style="text-align: right;">75</p> <p>1 <b>A I do not agree with that. It's possible</b><br/>2 <b>to have binaural sound that doesn't match the</b><br/>3 <b>listener's hearing characteristics and therefore</b><br/>4 <b>it would not be externalized.</b><br/>5 Q Okay. So can you turn back to<br/>6 Exhibit 230, please.<br/>7 <b>A This is the one we're in right now?</b><br/>8 Q Yes. I'm sorry, Dr. Roginska's<br/>9 transcript.<br/>10 <b>A Yes.</b><br/>11 Q And can we go to Page 35 of that<br/>12 transcript. And I'll direct your attention to<br/>13 Page 134.<br/>14 <b>A Okay.</b><br/>15 Q And Lines 8 through 19, can you read that,<br/>16 please?<br/>17 ATTORNEY TENNANT: Same objections to<br/>18 these -- this exhibit, the same standing<br/>19 objections as before.<br/>20 <b>A Okay.</b><br/>21 Q Do you agree with Dr. Roginska's testimony<br/>22 here?</p>                                                                                                                                                                                                                                                                                                                                                                |
| <p style="text-align: right;">74</p> <p>1 ATTORNEY TENNANT: Objection. Calls for<br/>2 speculation. Mischaracterizes the document.<br/>3 <b>A Without knowing the context of what</b><br/>4 <b>Claim 1 says, I would not agree. I'm</b><br/>5 <b>externalizing your voice right now and we don't</b><br/>6 <b>have binaural sound at all. So I don't know</b><br/>7 <b>what's being discussed here.</b><br/>8 Q Okay. So you disagree with Dr. Roginska's<br/>9 statement that you would need -- that you would<br/>10 need HRTF processing and you would need binaural<br/>11 sound in order to externalize a sound?<br/>12 ATTORNEY TENNANT: Objection. Calls for<br/>13 speculation. Mischaracterizes the document.<br/>14 <b>A Without knowing more about how the sound</b><br/>15 <b>is being played back, I -- I would disagree if</b><br/>16 <b>this -- if this implied that this is the only way</b><br/>17 <b>to externalize. But I doubt that that's what</b><br/>18 <b>she's saying. I don't know the context.</b><br/>19 Q Do you agree that if a sound is not<br/>20 externalized, then it is not binaural sound?<br/>21 ATTORNEY TENNANT: Objection to form.<br/>22 Incomplete hypothetical.</p> | <p style="text-align: right;">76</p> <p>1 ATTORNEY TENNANT: Objection. Calls for<br/>2 speculation, relevance.<br/>3 <b>A Again, without context, I believe what</b><br/>4 <b>she's talking about is if the perceptual cues that</b><br/>5 <b>are expected by the listener to perceive distance</b><br/>6 <b>and location direction are altered, then the</b><br/>7 <b>effect goes away. I would argue that the sound</b><br/>8 <b>that's being delivered is still technically</b><br/>9 <b>binaural, it just happens to be not the correct</b><br/>10 <b>binaural for that listener.</b><br/>11 <b>I believe that's what she's talking about</b><br/>12 <b>in Lines 14 through 19; eliminating the binaural</b><br/>13 <b>cues, she's talking about a specific listener, is</b><br/>14 <b>how I interpret this. So I do agree with that.</b><br/>15 Q So Dr. Roginska basically testified here<br/>16 that if a sound is not externalized, it cannot be<br/>17 binaural, correct?<br/>18 ATTORNEY TENNANT: Objection. Calls for<br/>19 speculation, form, and lack of foundation.<br/>20 <b>A I don't think that's a correct</b><br/>21 <b>interpretation of what she's saying. She's</b><br/>22 <b>talking about if it's not externalized for that</b></p> |

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| <p>77</p> <p>1 listener, then it's not proper binaural.<br/>2 But as we know from this field, the same<br/>3 signal played for a different listener with the<br/>4 same modifications could be externalized. And so<br/>5 the signal is -- remains binaural, it's just that<br/>6 it's not perceived in this hypothetical that she's<br/>7 being presented with by this listener.<br/>8 ATTORNEY PARTRIDGE: Okay. Let's take a<br/>9 quick break.<br/>10 THE WITNESS: Okay.<br/>11 ATTORNEY PARTRIDGE: Okay.<br/>12 THE VIDEOGRAPHER: Okay. We are going off<br/>13 the record. The time is 2:03.<br/>14 (Recess.)<br/>15 THE VIDEOGRAPHER: We are back on the<br/>16 record. The time is 2:13.<br/>17 Q Okay. Dr. K, I'm going to refer you back<br/>18 to Exhibit 2030, which is the transcript of<br/>19 Dr. Roginska. Okay?<br/>20 A Okay.<br/>21 Q And can you go to Page 37 of that exhibit,<br/>22 please.</p>                                                                                                 | <p>79</p> <p>1 that binaural sound is very listener-specific.<br/>2 Q Right. And what I was asking you, if a<br/>3 sound is not external for a listener, the sound<br/>4 cannot be binaural for that listener, correct?<br/>5 ATTORNEY TENNANT: Objection. Incomplete<br/>6 hypothetical. Lack of foundation.<br/>7 A Well, so this is the part that's out of<br/>8 context. Is the listener wearing headphones? Are<br/>9 they using speakers? Can it be either? I don't<br/>10 know how to answer that.<br/>11 Q So do you -- so you disagree with<br/>12 Dr. Roginska's testimony here?<br/>13 A No. She might be talking about a case<br/>14 where that's true, I just don't know the context.<br/>15 Q Okay. You can put that away for a minute.<br/>16 A Okay.<br/>17 Q Changing topics, do you agree that the<br/>18 term "delay," by and of itself, could encompass a<br/>19 broad range of concepts in audio engineering and<br/>20 audio signal processing?<br/>21 ATTORNEY TENNANT: Objection. Lack of<br/>22 foundation.</p> |
| <p>78</p> <p>1 A Okay.<br/>2 Q And I would like you to read -- do you see<br/>3 Page 143 on the top right of the transcript?<br/>4 A Yes.<br/>5 Q I would like you to read Page 143, Line 3<br/>6 through Line 8, please.<br/>7 A Okay.<br/>8 Q And do you agree with Dr. Roginska that if<br/>9 a sound is not external for a user, the sound<br/>10 cannot be binaural for that user?<br/>11 ATTORNEY TENNANT: Objection. Calls for<br/>12 speculation. Relevance.<br/>13 A I think we're 143 pages into it, so I<br/>14 don't know what the whole discussion is about.<br/>15 My answer is similar to before. I believe<br/>16 what Dr. Roginska is talking about is that it's<br/>17 not -- if the binaural sound has been altered in<br/>18 some way so that the user, that listener, is not<br/>19 experiencing externalization, assuming they were<br/>20 experiencing it before the alteration, then it's<br/>21 no longer binaural but for that listener.<br/>22 And I think it's important to emphasize</p> | <p>80</p> <p>1 A I agree with that, yes.<br/>2 Q So can you pull up - I think you might<br/>3 have it - your declaration in this case, which is<br/>4 Exhibit 1055, I believe. One of your<br/>5 declarations.<br/>6 A I'm sorry. Is that the original<br/>7 declaration or the -- or the response that I've --<br/>8 Q The response.<br/>9 A Yes.<br/>10 Q You've got it?<br/>11 A I have it.<br/>12 Q You drafted this declaration?<br/>13 A I did.<br/>14 Q Okay. Can we go to -- give me one second.<br/>15 I've got to get it myself. I've got stuff<br/>16 everywhere, and there's only like three exhibits<br/>17 we've been using.<br/>18 Can you go to Page 8 -- I'm sorry,<br/>19 Paragraph 8 of your declaration, please.<br/>20 A Okay.<br/>21 Q Of Exhibit 155.<br/>22 A Exhibit 1055, right?</p>                                                                                                                                                                                                                           |

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| <p style="text-align: right;">81</p> <p>1 Q Can you go to Exhibit 1055, which is your<br/>2 declaration in support of petitioner's reply to<br/>3 patent owner's response, correct?<br/>4 <b>A Yes, I'm there.</b><br/>5 Q Okay. And on Paragraph -- at Paragraph 8,<br/>6 do you see that you have referenced Asahi in that<br/>7 paragraph?<br/>8 <b>A Yes.</b><br/>9 Q Have you read Asahi?<br/>10 <b>A I have.</b><br/>11 Q Is it an article, a patent, a book?<br/>12 <b>A It's a patent.</b><br/>13 Q Do you see that you have not cited to any<br/>14 specific place in Asahi in Paragraph 8?<br/>15 <b>A You mean a specific page? I see that,</b><br/>16 <b>yes.</b><br/>17 Q Do you also see that you have referenced<br/>18 Bauer?<br/>19 <b>A Yes.</b><br/>20 Q And do you see that the reference to Bauer<br/>21 is to Exhibit 1026 at Page 69? Do you see that?<br/>22 <b>A I have to go back and look. Is that -- am</b></p>                                                               | <p style="text-align: right;">83</p> <p>1 Q And can you turn to Page 2 of<br/>2 Exhibit 1026, please.<br/>3 <b>A Okay.</b><br/>4 Q Who are the authors?<br/>5 <b>A Are we talking about the Bauer?</b><br/>6 Q Well, Exhibit 1026, you said that was<br/>7 Bauer. So I'm asking you, on Page 2, who are the<br/>8 authors?<br/>9 <b>A Okay. Now I'm worried that I have the</b><br/>10 <b>wrong exhibit, because I only have one author in</b><br/>11 <b>Bauer.</b><br/>12 Q Because you only have, I'm sorry?<br/>13 <b>A I only show Bauer as the author in my</b><br/>14 <b>Bauer, but I'm wondering if I'm looking at the</b><br/>15 <b>wrong one. Maybe somebody can correct me.</b><br/>16 Q So that's what I'm trying to figure out,<br/>17 because you referenced this Exhibit 1026 as Bauer,<br/>18 correct?<br/>19 <b>A Right. But the Bauer that I have in my</b><br/>20 <b>files here is a single author, Ben Bauer, Journal</b><br/>21 <b>of the Audio Engineering Society, April 1961. I</b><br/>22 <b>don't know if there is a typo in my -- in my</b></p> |
| <p style="text-align: right;">82</p> <p>1 <b>I referencing Dr. Begault's book here or Bauer?</b><br/>2 <b>I'm not sure.</b><br/>3 Q Okay. But you say there --<br/>4 <b>A I'm sorry, I don't recognize the exhibit</b><br/>5 <b>numbers, so I would have to...</b><br/>6 Q Okay. Well, let's pull up Exhibit 1026,<br/>7 because I just need to understand where Bauer is.<br/>8 Do you have that?<br/>9 <b>A Yes. Okay. So 1026 is Bauer, yes.</b><br/>10 Q Okay.<br/>11 <b>A The page number doesn't make sense,</b><br/>12 <b>though. So I'm not -- there might be a typo here.</b><br/>13 Q So what did you say, the Page 69? So what<br/>14 is the title of Exhibit 1026, please?<br/>15 <b>A "Stereophonic Earphones and Binaural Loud</b><br/>16 <b>Speakers."</b><br/>17 Q And what is -- is that -- you said that<br/>18 was Bauer. Is it Bauer?<br/>19 <b>A It is, yeah.</b><br/>20 Q And then you also say that Bauer is cited<br/>21 in Dr. Begault's book, correct?<br/>22 <b>A Yes.</b></p> | <p style="text-align: right;">84</p> <p>1 <b>response.</b><br/>2 Q So you say it's cited in Dr. Begault's<br/>3 book, correct?<br/>4 <b>A Yes.</b><br/>5 Q But Dr. Begault's book is not<br/>6 Exhibit 1026, right?<br/>7 <b>A I don't believe so. I'm sorry, I don't</b><br/>8 <b>know all the exhibit numbers in my head.</b><br/>9 Q Okay. Well, just pull up -- well, you're<br/>10 looking at 1026, correct?<br/>11 <b>A That's what's marked here in my folder.</b><br/>12 <b>Let me...</b><br/>13 Q And that's not Dr. Begault's book,<br/>14 correct?<br/>15 <b>A No, it's not.</b><br/>16 Q Okay. Can you pull up 1036, please.<br/>17 <b>A Okay. Yes, that is Dr. Begault's book.</b><br/>18 Q And can you go to Page 69, please.<br/>19 <b>A PDF 69, or -- no, I think you mean...</b><br/>20 <b>Q Page 69 of the book.</b><br/>21 <b>A Of the book. Okay.</b><br/>22 <b>Q Okay. And is -- where is Bauer referenced</b></p>                                                                                                                                   |

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| <p>85</p> <p>1 on Page 69 of Dr. Begault's book?</p> <p>2 <b>A There appears to be a typo in my report.</b></p> <p>3 <b>Bauer is mentioned on Page 57 of Dr. Begault's</b></p> <p>4 <b>book.</b></p> <p>5 Q So in your -- in your declaration, you</p> <p>6 don't have any citation to Bauer that's specific</p> <p>7 to a page number, right?</p> <p>8 ATTORNEY TENNANT: Objection to form.</p> <p>9 <b>A I was making a statement based on having</b></p> <p>10 <b>read Bauer.</b></p> <p>11 Q But you don't cite any particular page of</p> <p>12 Bauer in that paragraph, correct?</p> <p>13 ATTORNEY TENNANT: Objection to form.</p> <p>14 Asked and answered.</p> <p>15 <b>A No, I'm just providing a summary sentence</b></p> <p>16 <b>that's there.</b></p> <p>17 Q Okay. But there is no cite in -- to where</p> <p>18 you're talking about in Bauer in Paragraph 8,</p> <p>19 right?</p> <p>20 ATTORNEY TENNANT: Objection. Asked and</p> <p>21 answered.</p> <p>22 <b>A It's just a summary.</b></p> | <p>87</p> <p>1 <b>A No --</b></p> <p>2 ATTORNEY TENNANT: Objection. Asked and</p> <p>3 answered.</p> <p>4 <b>A Not for this -- for the summary, no.</b></p> <p>5 Q And then you see you talk about Bauer</p> <p>6 again in Paragraph 35?</p> <p>7 <b>A Yes, in the same way. I summarize it.</b></p> <p>8 Q Right. And there is nothing specific to a</p> <p>9 page number or anything in Bauer in Paragraph 35,</p> <p>10 correct?</p> <p>11 <b>A It's a summary. It can be interpreted</b></p> <p>12 <b>even from the title of Bauer. But you're right,</b></p> <p>13 <b>there is no page number.</b></p> <p>14 Q And also Bauer is not talked about on</p> <p>15 Page 69 of Dr. Begault's book, correct?</p> <p>16 <b>A No, that appears to be the same typo. It</b></p> <p>17 <b>was cut and paste.</b></p> <p>18 ATTORNEY PARTRIDGE: Okay. Let's take a</p> <p>19 short break, please.</p> <p>20 THE WITNESS: Okay.</p> <p>21 THE VIDEOGRAPHER: Okay. We are going off</p> <p>22 the record. The time is 2:27.</p> |
| <p>86</p> <p>1 Q And there is no cite in Paragraph 8,</p> <p>2 correct, regarding --</p> <p>3 ATTORNEY TENNANT: Objection -- objection,</p> <p>4 asked and answered.</p> <p>5 <b>A I don't see a page citation, because I'm</b></p> <p>6 <b>not quoting, I'm just summarizing.</b></p> <p>7 Q Okay. So can you turn to Paragraph 35</p> <p>8 of your -- of Exhibit 1055.</p> <p>9 <b>A Yes.</b></p> <p>10 Q Are you there?</p> <p>11 <b>A I'm there.</b></p> <p>12 Q Okay. And you see again that you've</p> <p>13 referenced Asahi in Paragraph 35, correct?</p> <p>14 <b>A Yes.</b></p> <p>15 Q And again, you haven't cited any</p> <p>16 specific -- to any specific place in Asahi in</p> <p>17 Paragraph 35, correct?</p> <p>18 <b>A Right. Because I'm not quoting, I am just</b></p> <p>19 <b>summarizing probably from the abstract. I'd have</b></p> <p>20 <b>to go back and look.</b></p> <p>21 Q But no specific cite is in Paragraph 35 to</p> <p>22 Asahi?</p>                                    | <p>88</p> <p>1 (Recess.)</p> <p>2 THE VIDEOGRAPHER: We are back on the</p> <p>3 record. The time is 2:42.</p> <p>4 Q Are you all ready?</p> <p>5 <b>A Yes.</b></p> <p>6 Q Okay. I had my sound turned off. Sorry.</p> <p>7 Are you all ready?</p> <p>8 <b>A Yes.</b></p> <p>9 Q I was, like, why are you looking at me</p> <p>10 like that, Dr. K?</p> <p>11 THE VIDEOGRAPHER: And counsel, just to</p> <p>12 let you know, I read us back on and we are</p> <p>13 recording now, so...</p> <p>14 ATTORNEY PARTRIDGE: Oh, shoot. Okay.</p> <p>15 We're back on. Sorry about that.</p> <p>16 Q Okay. Can you pull up, if you don't still</p> <p>17 have it, but if you do, pull up Exhibit 126 again,</p> <p>18 please, Dr. K?</p> <p>19 <b>A Yes.</b></p> <p>20 ATTORNEY TENNANT: Can you do me a favor</p> <p>21 and drop the exhibits in the chat you're going to</p> <p>22 question about?</p>                                                                                                                       |

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| <p>89</p> <p>1 ATTORNEY PARTRIDGE: Oh, absolutely. I<br/>2 apologize, I thought you had it.<br/>3 <b>A I think there was a mis-numbering, as we<br/>4 were just talking about, so that my Bauer was<br/>5 incorrectly numbered somehow in my file. So 1026<br/>6 is actually not Bauer. I think it's 1053, which<br/>7 is what I should have read at the end of my<br/>8 Paragraph 8.<br/>9 1026 is a different paper by Middlebrooks.<br/>10 And I think that's why you were asking who are the<br/>11 authors, because there's two authors on that one.</b><br/>12 Q Okay.<br/>13 ATTORNEY TENNANT: Did you put it in the<br/>14 chat?<br/>15 ATTORNEY PARTRIDGE: Yeah, just a second.<br/>16 Homi is doing it.<br/>17 ATTORNEY RAFATIJO: All the exhibits are<br/>18 all in the chat. Every exhibit that we have<br/>19 introduced, they are all in the chat and they are<br/>20 available to everyone.<br/>21 Q So can you pull up Exhibit 1036, please.<br/>22 That should be Dr. Begault's book.</p> | <p>91</p> <p>1 <b>A Yes. I'm looking at it right now.</b><br/>2 Q Okay. And did he cite -- so I'm talking<br/>3 about Page 57 of Dr. Begault's book and where he<br/>4 cites Bauer. Okay?<br/>5 <b>A Yes.</b><br/>6 Q And did Dr. Begault cite Bauer to discuss<br/>7 "Substituting earphones for loud speakers without<br/>8 substantial loss of space perspective using<br/>9 filters and delays, not HRTFs"?<br/>10 <b>A I don't know what he had in mind when he<br/>11 wrote this, but he's citing Bauer - I'm just<br/>12 reading here quickly - as well as the original<br/>13 works in this field to produce sounds in space.<br/>14 So 3D sounds in space is what he means.</b><br/>15 <b>So I don't -- he's not -- he's obviously<br/>16 not citing a specific page, but I think he's just<br/>17 using a citation just to show that there was work<br/>18 being done by Bauer in this field.</b><br/>19 Q So in your declaration, in Paragraphs 8<br/>20 and 35, you say that -- that in Dr. Begault's<br/>21 book, he discussed, "Substituting earphones for<br/>22 loud speakers without substantial loss of space</p> |
| <p>90</p> <p>1 <b>A It is.</b><br/>2 ATTORNEY PARTRIDGE: And Mr. Tennant, do<br/>3 you have 1036?<br/>4 ATTORNEY TENNANT: I do, yes.<br/>5 Q Okay. So we're all on Exhibit 1036,<br/>6 correct?<br/>7 <b>A Correct.</b><br/>8 Q And we -- and Dr. Kyriakakis, 1036 is<br/>9 Dr. Begault's book, and we talked about your<br/>10 reference of Dr. Begault's book in<br/>11 Paragraphs 8 and 15 of your declaration, which is<br/>12 Exhibit 1055, correct?<br/>13 <b>A Correct.</b><br/>14 Q And in Paragraphs 8 and 35, you have --<br/>15 you said that Dr. Begault cited Bauer on Page 57<br/>16 of his book, correct?<br/>17 ATTORNEY TENNANT: Objection, form.<br/>18 Mischaracterizes the document.<br/>19 <b>A I said that in my testimony, but I said<br/>20 that there was a typo in my -- in my text.</b><br/>21 Q Okay. So does Dr. Begault cite Bauer on<br/>22 Page 57?</p>                                                                                                                    | <p>92</p> <p>1 perspective using filters and delays, not HRTFs,"<br/>2 correct?<br/>3 ATTORNEY TENNANT: Objection.<br/>4 Mischaracterizes the document.<br/>5 <b>A Bauer discussed that, and Bauer is also<br/>6 referenced as a paper in Dr. Begault's book.</b><br/>7 Q So where does Dr. Begault discuss this?<br/>8 <b>A Dr. Begault -- all I'm saying is,<br/>9 Paragraph 8 is, "Bauer," comma, "which was also<br/>10 cited in Dr. Begault's book," comma. I'm not<br/>11 saying what Dr. Begault is discussing, I'm just<br/>12 saying that he cited Bauer in his book. The point<br/>13 being that it was a well-known paper.</b><br/>14 Q When you say, "it was a well-known paper,"<br/>15 you -- what are you referring to?<br/>16 <b>A Bauer's paper was well known to a<br/>17 POSITA -- to a POSITA in the field, in this field.</b><br/>18 Q But Dr. Begault was not talking about --<br/>19 in his book at Page 57 he was not talking about,<br/>20 "Substituting earphones for loud speakers without<br/>21 substantial loss of space perspective using<br/>22 filters and delays, not HRTFs," correct?</p>        |

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| <p>93</p> <p>1     <b>A I didn't say that Dr. Begault was</b><br/>2 <b>discussing that. I'm just summarizing the Bauer</b><br/>3 <b>paper, and indicating as an aside that the Bauer</b><br/>4 <b>paper also appears as a reference in Dr. Begault's</b><br/>5 <b>paper -- book.</b><br/>6     Q Okay. So you're not citing Dr. Begault<br/>7 for that proposition, correct?<br/>8     <b>A I'm not citing anyone. I'm just</b><br/>9 <b>summarizing Bauer in that sentence, and -- well,</b><br/>10 <b>citing his paper, but not to a page.</b><br/>11     Q Okay. So let's -- can you pull up<br/>12 Exhibit 2029, please.<br/>13     ATTORNEY PARTRIDGE: And Mr. Tennant, if<br/>14 that's not in the chat, let us know.<br/>15     And that's Dr. Welch's transcript.<br/>16     <b>A Oh, I see. Probably...</b><br/>17     ATTORNEY TENNANT: We have the same<br/>18 standing objections to this, as well as its<br/>19 admissibility in this proceeding.<br/>20     <b>A I'm sorry...</b><br/>21     Q Page 47, Dr. K.<br/>22     <b>A Yeah, I have to find it. Here we go.</b></p> | <p>95</p> <p>1 voice and convolves it with HRTF"?<br/>2     ATTORNEY TENNANT: Objection.<br/>3 Mischaracterizes the document. Relevance.<br/>4     <b>A He's saying several things here. He -- in</b><br/>5 <b>the discussion he talks about that, but I think --</b><br/>6 <b>I would say that the first part of his answer on</b><br/>7 <b>Line 7 -- I'm starting on Page 183, Line 7, is</b><br/>8 <b>almost an exact paraphrase of what I testified to</b><br/>9 <b>earlier and how it depends. Line 1 of Page 184</b><br/>10 <b>is, "So it is in your head, in front of your</b><br/>11 <b>mouth, inside, somewhere around there." I think I</b><br/>12 <b>gave a similar -- it's difficult to say exactly</b><br/>13 <b>where. So I agree with all of that.</b><br/>14     <b>Now you're asking about the question on</b><br/>15 <b>Line 7, and he's giving a method of externalizing</b><br/>16 <b>it, which is using HRTFs. So I agree with that,</b><br/>17 <b>and I also agree that it would be very weird, as</b><br/>18 <b>he says -- so generally I agree with that. I just</b><br/>19 <b>don't want to make it sound like the HRTFs is the</b><br/>20 <b>only way to do that. But I do agree with what</b><br/>21 <b>he's saying.</b><br/>22     ATTORNEY PARTRIDGE: Okay. I'll pass the</p> |
| <p>94</p> <p>1 <b>Page 47 of the PDF?</b><br/>2     Q Yes.<br/>3     <b>A Okay.</b><br/>4     Q Okay. I'm going to direct your attention<br/>5 back to the testimony on Pages 183 and 184 of<br/>6 Dr. Welch, and it's -- I direct you specifically<br/>7 to Page 183, Line 1, through Page 184, Line 19.<br/>8     Can you read that, please.<br/>9     <b>A Okay.</b><br/>10     ATTORNEY TENNANT: Counsel, what -- maybe<br/>11 I have it wrong, 183 starts in the middle of a<br/>12 question. Do you mean the...<br/>13     ATTORNEY PARTRIDGE: Thank you,<br/>14 Mr. Tennant. I apologize.<br/>15     Q Can you start on Page 182, Line 21, and<br/>16 it's just below that. I apologize. And to -- and<br/>17 read through 184, Line 19.<br/>18     <b>A Okay. (Document review.)</b><br/>19     <b>Okay.</b><br/>20     Q And do you see that Dr. Welch has<br/>21 testified that, "The voice of a person is not<br/>22 external to that person unless someone takes the</p>                                                                                                      | <p>96</p> <p>1 witness.<br/>2     ATTORNEY TENNANT: Thank you. Let's take<br/>3 a break.<br/>4     ATTORNEY PARTRIDGE: Okay. Do you know<br/>5 how long?<br/>6     ATTORNEY TENNANT: Ten minutes. I will<br/>7 let you know if we go longer. Okay?<br/>8     ATTORNEY PARTRIDGE: Okay. Thank you.<br/>9     THE VIDEOGRAPHER: Okay. We are going off<br/>10 the record. The time is 2:54.<br/>11     (Recess.)<br/>12     THE VIDEOGRAPHER: We are back on the<br/>13 record. The time is 3:05 P.M.<br/>14     ATTORNEY TENNANT: Meta has no questions,<br/>15 so I think we're done.<br/>16     ATTORNEY PARTRIDGE: But I have some more.<br/>17 No, I'm teasing. I'm good. I'm sorry, I know<br/>18 sometimes I think I'm funny and no one else does.<br/>19     Dr. K, did you think I was funny?<br/>20     THE WITNESS: I did think that, yes.<br/>21     ATTORNEY PARTRIDGE: Okay. Good.<br/>22     Mr. Tennant, it was great to meet you.</p>                                                                                                                                                                                                                                                                                                                                                       |

Transcript of Dr. Chris Kyriakakis  
Conducted on August 23, 2024

25 (97 to 100)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <p>97</p> <p>1 Thank you so much.</p> <p>2 ATTORNEY TENNANT: Nice to meet you as</p> <p>3 well. Take care. Have a nice weekend.</p> <p>4 THE VIDEOGRAPHER: This marks the end of</p> <p>5 the videotaped deposition of Dr. Chris Kyriakakis.</p> <p>6 We are going off the record. The time is</p> <p>7 3:05.</p> <p>8 (Time Noted: 3:05 P.M.)</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p>                                                        | <p>99</p> <p>1 CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC</p> <p>2</p> <p>3 I, Anita M. Trombetta, Certified Reporter and</p> <p>4 Notary Public within and for the State of New York</p> <p>5 do hereby certify: That DR. CHRIS KYRIAKAKIS, the</p> <p>6 Witness whose deposition is hereinbefore set</p> <p>7 forth, was duly sworn by me before the</p> <p>8 commencement of such deposition and that such</p> <p>9 deposition was taken before me and is a true</p> <p>10 record of the testimony given by such</p> <p>11 Witness.</p> <p>12</p> <p>13 I further certify that the adverse party, META</p> <p>14 PLATFORMS, INC., was represented by counsel at the</p> <p>15 deposition.</p> <p>16</p> <p>17 I further certify that the deposition of</p> <p>18 DR. CHRIS KYRIAKAKIS, occurred remotely via Zoom,</p> <p>19 on Friday, August 23, 2024, commencing at</p> <p>20 12:01 P.M. (EST) to 3:05 P.M.</p> <p>21</p> <p>22</p> |
| <p>98</p> <p>1 ACKNOWLEDGMENT OF DEPONENT</p> <p>2 I, DR. CHRIS KYRIAKAKIS, do hereby</p> <p>3 acknowledge that I have read and examined the</p> <p>4 foregoing testimony and the same is a true,</p> <p>5 correct, and complete transcription of the</p> <p>6 testimony given by me and any corrections appear</p> <p>7 on the attached errata sheet signed by me.</p> <p>8</p> <p>9 _____</p> <p>10 (SIGNATURE) (DATE)</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> | <p>100</p> <p>1 I further certify that I am not related to</p> <p>2 Any of the parties to this action by blood or</p> <p>3 Marriage, I am not employed by or an attorney to</p> <p>4 any of the parties to this action, and that I am</p> <p>5 in no way interested, financially or otherwise, in</p> <p>6 the outcome of this matter.</p> <p>7 IN WITNESS WHEREOF, I have hereunto set my</p> <p>8 Hand this 25th day of August, 2024.</p> <p>9 My commission expires:</p> <p>10</p> <p>11</p> <p>12 </p> <p>13 _____</p> <p>14 NOTARY PUBLIC IN AND FOR</p> <p>15 THE STATE OF NEW YORK</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p>                                                                                                                                                                                          |

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Transcript of Dr. Chris Kyriakakis  
Conducted on August 23, 2024

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Transcript of Dr. Chris Kyriakakis  
Conducted on August 23, 2024

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Transcript of Dr. Chris Kyriakakis  
Conducted on August 23, 2024

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Transcript of Dr. Chris Kyriakakis  
Conducted on August 23, 2024

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Transcript of Dr. Chris Kyriakakis  
Conducted on August 23, 2024

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