

# **EXHIBIT 32**

# **REDACTED**

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UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF VIRGINIA  
ALEXANDRIA DIVISION

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UNITED STATES OF AMERICA, :  
 et al., :  
 Plaintiffs :  
 v. : No. 1:23-cv-00108  
 GOOGLE, LLC, :  
 Defendant. :

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Tuesday, February 20, 2024

Video Deposition of RAMAMOORTHY RAVI,  
PH.D., taken at the Offices of the United States  
Department of Justice, 450 Fifth Street  
Northwest, Washington, D.C., beginning at 9:32  
a.m. Eastern Standard Time, before Ryan K. Black,  
Registered Professional Reporter, Certified  
Livenote Reporter and Notary Public in and for  
the District of Columbia

Job No. CS6456599

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1 BY MR. ISAACSON:  
 2 Q. Okay. And before this case, had you  
 3 heard the term "open web display"?  
 4 A. Do you just mean the term "open web  
 5 display" or "open web display advertising"?  
 6 Q. Open web display advertising, yes.  
 7 A. Open web display advertising, yes, I --  
 8 Q. Had you heard those four words together  
 9 before this case?  
 10 A. I believe I should have come across that  
 11 before this case.  
 12 Q. Do you remember where?  
 13 A. Open auctions versus private auctions is  
 14 something I heard about early on.  
 15 Q. All right. So you were familiar with  
 16 the term "open web display advertising" because  
 17 you were familiar with open auctions versus  
 18 private auctions; is that right?  
 19 MR. WOLIN: Objection to form.  
 20 THE WITNESS: That -- that's the  
 21 connection I made to open web display  
 22 advertising.  
 23 BY MR. ISAACSON:  
 24 Q. All right. Open web display advertising  
 25 is something used in open auctions as opposed to

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1 private auctions? Is that your understanding?  
 2 MR. WOLIN: Objection to form.  
 3 THE WITNESS: Loosely speaking. I  
 4 haven't thought deeply about these terms.  
 5 I -- I have come across them as a way of  
 6 understanding what the distinction is between the  
 7 private and the open sale of these display ads.  
 8 BY MR. ISAACSON:  
 9 Q. All right. So based on your background  
 10 -- and you've told me before you've got some  
 11 expertise in the area of digital advertising,  
 12 correct?  
 13 A. Yes. I -- I did mention earlier that.  
 14 Q. Right. And based on your expertise in  
 15 the field of digital advertising, the way you  
 16 understood the term "open web display  
 17 advertising" is that's something used in  
 18 connection with an open auction for advertising  
 19 as opposed to a private auction?  
 20 MR. WOLIN: Objection to form.  
 21 THE WITNESS: It is one of the ways I  
 22 related to that term, since you were asking me  
 23 about my familiarity with that phrase.  
 24 BY MR. ISAACSON:  
 25 Q. All right. And in terms of your

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1 expertise in digital advertising and your  
 2 writings in that area, the markets that you are  
 3 familiar with are display advertising market and  
 4 a digital advertising market that are referred to  
 5 in your article; is that correct?  
 6 MR. WOLIN: Objection to form.  
 7 THE WITNESS: The first line in the  
 8 article, like in many research articles, is meant  
 9 to motivate the importance of the aspect being  
 10 studied. And that was the purpose of that first  
 11 sentence, that display advertising is a large  
 12 -- in this particular case -- a 54 percent  
 13 fraction of the digital advertising market,  
 14 as defined in that citation.  
 15 BY MR. ISAACSON:  
 16 Q. And that -- you say it's motivated  
 17 -- when you say it's motivated, you're not trying  
 18 to say that it's incorrect, are you?  
 19 MR. WOLIN: Objection to form.  
 20 THE WITNESS: We have a citation to a  
 21 public-facing information source that --  
 22 BY MR. ISAACSON:  
 23 Q. Right. And -- and at the time of this  
 24 article, based on your expertise in digital  
 25 advertising, you understood there was a digital

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1 advertising market. That's the title, right,  
 2 there: "Evolution of Display Advertising Market"?  
 3 And that you also -- and that there was also a  
 4 digital advertising market referred to in the  
 5 first sentence, correct?  
 6 MR. WOLIN: Objection to form.  
 7 THE WITNESS: Yes. The first sentence  
 8 talks about that.  
 9 BY MR. ISAACSON:  
 10 Q. We can -- your report -- in your summary  
 11 of opinions, Paragraph 12(a), which is discussing  
 12 the Waterfall and Dynamic Allocation?  
 13 A. I see that.  
 14 Q. Do you see that?  
 15 And you see in the bolded title,  
 16 it says that the wat -- "The Waterfall and  
 17 Dynamic Allocation" -- amongst other things -  
 18 "Harmed Google's Own customers." Do you see  
 19 that?  
 20 A. Yes, it says "Potentially Harmed  
 21 Google's Own Customers."  
 22 Q. Potentially. Yes. Thank you.  
 23 Are you reaching the conclusion that  
 24 it actually harmed Google's own customers, the  
 25 Waterfall and Dynamic Allocation? Or was that

Page 94	<p>1 account . . .</p> <p>2 A. That was the one to three percent</p> <p>3 citation earlier.</p> <p>4 Q. Oh, so the one to three percent is to</p> <p>5 one rival?</p> <p>6 MR. WOLIN: Objection to form.</p> <p>7 THE WITNESS: We are looking at</p> <p>8 Footnotes 499 and 498 in Page 116 of my report.</p> <p>9 BY MR. ISAACSON:</p> <p>10 Q. All right. With regards to Rubicon,</p> <p>11 that's one rival, correct?</p> <p>12 A. That's correct. That's the latter one</p> <p>13 that I cited.</p> <p>14 Q. Right.</p> <p>15 A. The reduction in vendor rate, yes.</p> <p>16 Q. Did you do anything to attempt to</p> <p>17 quantify the effect of Google's conduct on rivals</p> <p>18 other than look at documentation about Google</p> <p>19 experiments?</p> <p>20 MR. WOLIN: Objection to form.</p> <p>21 THE WITNESS: To examine the effect on</p> <p>22 rivals, I had to read the -- the design documents</p> <p>23 of these conducts to understand how they worked.</p> <p>24 As I mentioned earlier, I had to look through</p> <p>25 pseudocode, snapshots of the source code, and</p>	Page 96	<p>1 that I --</p> <p>2 Q. And did you not attempt to replicate the</p> <p>3 work of any of those experiments, correct?</p> <p>4 MR. WOLIN: Objection to form.</p> <p>5 THE WITNESS: I did not carry out any</p> <p>6 data experiments involving simulations related to</p> <p>7 these conducts.</p> <p>8 BY MR. ISAACSON:</p> <p>9 Q. All right. You -- you have not carried</p> <p>10 out any experiments in this case related to the</p> <p>11 Google conduct that you discuss in your reports,</p> <p>12 correct?</p> <p>13 MR. WOLIN: Objection to form.</p> <p>14 THE WITNESS: As I was saying just a</p> <p>15 moment ago, I did not run any simulations or</p> <p>16 regressions on data in arriving at the opinions</p> <p>17 in my report.</p> <p>18 BY MR. ISAACSON:</p> <p>19 Q. All right. If I can jump ahead here to</p> <p>20 Paragraph 258 of your opening report.</p> <p>21 And here you're discussing the subject</p> <p>22 of what you say "Google's restriction of Google</p> <p>23 Ads' demand primarily to AdX." Do you see that?</p> <p>24 A. Yes. I see Paragraph 258.</p> <p>25 Q. And as I understand your concern here</p>
Page 95	<p>1 then read the communications related to</p> <p>2 experiments around these conducts that Google</p> <p>3 conducted internally and the email discussion</p> <p>4 about the motivations and the results of these</p> <p>5 conducts.</p> <p>6 BY MR. ISAACSON:</p> <p>7 Q. So but my question is more specific than</p> <p>8 what did -- I'm not asking you what you did to</p> <p>9 examine the effect on rivals. I'm asking you</p> <p>10 what did you do to quantify the effect of</p> <p>11 Google's conduct on rivals. So I'm going to ask</p> <p>12 you the question again: Did you do anything to</p> <p>13 attempt to quantify the effect of Google's</p> <p>14 conduct on rivals other than look at</p> <p>15 documentation about Google experiments?</p> <p>16 MR. WOLIN: Objection to form.</p> <p>17 THE WITNESS: My main source of</p> <p>18 conclusions about the -- the directional changes</p> <p>19 and the magnitudes of the effect on rivals are</p> <p>20 experiments on all of these conducts.</p> <p>21 BY MR. ISAACSON:</p> <p>22 Q. And you're referring -- when you say</p> <p>23 your main source is experiments, you mean Google</p> <p>24 experiments?</p> <p>25 A. That's correct. The Google experiment</p>	Page 97	<p>1 is that Google Ads demand would be primarily</p> <p>2 available only from AdX.</p> <p>3 MR. WOLIN: Objection to form.</p> <p>4 THE WITNESS: Primarily that would be</p> <p>5 the case, yes. Google Ads, advertisements,</p> <p>6 advertisers were available through AdX.</p> <p>7 BY MR. ISAACSON:</p> <p>8 Q. And when you say "Google Ads demand,"</p> <p>9 what do you mean?</p> <p>10 A. The requests for placing advertisements</p> <p>11 that arose from buyers that were affiliated with</p> <p>12 Google Ads.</p> <p>13 Q. Now, if DoubleClick for Publishers and</p> <p>14 AdX were offered as completely separate products</p> <p>15 but Google Ads demand was still not available to</p> <p>16 non-AdX exchanges, you would have the same</p> <p>17 concern, correct?</p> <p>18 MR. WOLIN: Objection to form.</p> <p>19 THE WITNESS: I did not really consider</p> <p>20 the possibility of DFP and AdX being separate.</p> <p>21 I think that's what you were asking about.</p> <p>22 BY MR. ISAACSON:</p> <p>23 Q. Mm-hmm. What your concern is is that</p> <p>24 Google Ads demand would have to be made available</p> <p>25 to non-AdX -- AdX exchanges. That's what you</p>

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1 want, right?

2 MR. WOLIN: Objection to form.

3 THE WITNESS: I do not have any specific

4 wants in this case.

5 BY MR. ISAACSON:

6 Q. Well, the -- that's fair. But the re --

7 what you call a "restriction of Google Ads

8 demand" means that Google Ads demand is not

9 available on non-AdX exchanges, correct?

10 MR. WOLIN: Objection to form.

11 THE WITNESS: It is a statement of where

12 Google Ads' demand is broadly available, and it

13 was for -- and it still is mainly available

14 through AdX.

15 BY MR. ISAACSON:

16 Q. And not available on non-AdX exchanges?

17 A. I -- I mentioned in a footnote somewhere

18 about other programs. It's also in my appendix

19 picture where I believe Google Ads tried to bid

20 in other exchanges for particularly valuable

21 impressions.

22 Q. Right. But at the end of Paragraph 258

23 you say, "As a result" -- and I believe you're

24 referring to Google's restriction of Google Ads

25 demand primarily to AdX -- "non-Google providers

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1 of ad tech products would struggle to attract new

2 customers or retain existing customers." Do you

3 see that?

4 A. I see that sentence.

5 Q. Right. And so in order to avoid that

6 situation where those non-Google providers of ad

7 tech products were struggling, what would have to

8 happen is they would have to have access to

9 Google Ads demand; is that correct?

10 MR. WOLIN: Objection to form.

11 THE WITNESS: That would be a reasonable

12 possibility, yeah.

13 BY MR. ISAACSON:

14 Q. And the non-Google providers of ad tech

15 products there, those are non-AdX exchanges,

16 correct?

17 A. I think you're referring to non-AdX

18 exchanges, yes.

19 Q. Right. And if -- if Google Ads demand

20 was going to be made available to non-AdX

21 exchanges, what technical work would be required

22 for that?

23 MR. WOLIN: Objection to form.

24 THE WITNESS: I did not quite examine

25 that question that you're asking me.

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1 BY MR. ISAACSON:

2 Q. Do you have any idea as to the scope of

3 that work, how much work would be required, based

4 on your background in computer science?

5 MR. WOLIN: Objection to form.

6 THE WITNESS: Bidding in realtime

7 auctions via OpenRTB, I believe, became available

8 in 2010. So, I believe there would be some

9 technology to approach that question.

10 BY MR. ISAACSON:

11 Q. All right. But would you have -- in

12 order to make Google Ads demand available in

13 exchanges other than Google's AdX, you would have

14 to do technical work in order to make that demand

15 available at -- at those other exchanges,

16 correct?

17 MR. WOLIN: Objection to form.

18 THE WITNESS: As in any other case of

19 trying to buy from a different exchange, there

20 would be technical work involved.

21 BY MR. ISAACSON:

22 Q. Right. You would have to take the

23 exchanges of competitors of Google and connect

24 them to Google Ads' demand in a way that was

25 compatible with the technology of those

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1 competitors.

2 MR. WOLIN: Objection to form.

3 THE WITNESS: That's broadly true, as it

4 is true for AdX.

5 BY MR. ISAACSON:

6 Q. All right. And engineers -- some number

7 of engineers would actually have to go to work

8 and make sure that Google Ads' demand could be

9 sent to these other exchanges, and in a way that

10 was suitable and interoperable with those -- with

11 their technology?

12 MR. WOLIN: Objection to form.

13 THE WITNESS: As I believe they did with

14 AWBid, that is the case.

15 BY MR. ISAACSON:

16 Q. Right. And different exchanges could

17 have different technical systems, and so that

18 engineering work might have to vary from rival to

19 rival, correct?

20 MR. WOLIN: Objection to form.

21 THE WITNESS: What you're saying is

22 reasonable, yeah. Trying to make yourself

23 compatible with different technical interfaces

24 requires additional work.

25 BY MR. ISAACSON:

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1 Q. Right. And --

2 MR. WOLIN: Counsel, when you get a --

3 we've been going for an hour -- sorry to

4 interrupt -- when you get to a good spot.

5 MR. ISAACSON: I'll wrap it up. Yeah.

6 BY MR. ISAACSON:

7 Q. So when you're talking about a hundred

8 or more non-Google exchanges, do you have any

9 idea how much engineering work would have to be

10 done in order to make -- for Google to say "we're

11 gonna send our Google Ads demand to all of these

12 exchanges"?

13 MR. WOLIN: Objection to form.

14 THE WITNESS: I did not examine that

15 particular question, but some of this work seems

16 to have been carried out by AWBid and Marple.

17 MR. ISAACSON: Okay.

18 MR. WOLIN: All right. Let's take a

19 break and go off the record.

20 THE VIDEOGRAPHER: All right. Off the

21 record at 12:03.

22 (Recess taken.)

23 THE VIDEOGRAPHER: Back on the record at

24 12:18.

25 BY MR. ISAACSON:

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1 Q. Looking at Paragraph 258 again of your

2 report where we left off, --

3 A. Yes.

4 Q. -- you say in the middle of the

5 paragraph, "Theory from academic research on

6 two-sided platforms similarly posits that marquis

7 buyers in a platform make it more attractive to

8 sellers."

9 Do you consider the Google Ad technology

10 that you have looked at in this case to be a

11 two-sided platform?

12 MR. WOLIN: Objection to form.

13 THE WITNESS: Section 4(b) in my report

14 is about that and, indeed, Ad Exchange is a

15 two-sided platform.

16 BY MR. ISAACSON:

17 Q. Have you looked at any of the Google

18 technology in this case other than Google AdX?

19 A. I've also examined Google Ads, DV360 and

20 DFP.

21 Q. All right. And do you consider any of

22 them to be two-sided platforms?

23 MR. WOLIN: Objection to form.

24 THE WITNESS: To some extent, they are.

25 The buy-side products have as the two sides the

Page 104

1 advertisers and the exchanges, and the publisher

2 ad service have publishers and the ad exchanges,

3 if you will, and sometimes other buyers like

4 SSBs.

5 BY MR. ISAACSON:

6 Q. All right. The -- now, you have said in

7 your report that Google has -- Google's AdX has

8 gained scale because Google Ads bid primarily

9 into AdX. Is that generally right?

10 MR. WOLIN: Objection to form.

11 THE WITNESS: Are we looking at the same

12 paragraph?

13 BY MR. ISAACSON:

14 Q. No. No. I think you've said it many

15 times now.

16 A. Generally, yes.

17 MR. WOLIN: Objection to form.

18 BY MR. ISAACSON:

19 Q. Your report does not quantify how much

20 scale Google gained from Google Ads bidding

21 primarily to AdX; is that correct?

22 MR. WOLIN: Objection to form.

23 THE WITNESS: As we were discussing

24 before the break, there are experiments that

25 reveal the increase in the number of impressions

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1 that, for example, AdX is able to win because of

2 some of these conducts.

3 BY MR. ISAACSON:

4 Q. So other than looking at documents

5 describing Google experiments, your report does

6 not attempt to quantify how much scale Google

7 gained from Google Ads bidding primarily into

8 AdX; is that correct?

9 MR. WOLIN: Objection to form.

10 THE WITNESS: Again, as we were

11 discussing earlier, while I use the Google

12 documentary evidence to talk about the increase

13 in the scale of some of Google's products, I

14 don't have an explicit quantification of -- of

15 that using any data experiments that I have.

16 BY MR. ISAACSON:

17 Q. And you -- I believe you said this

18 before the break, but I want to get this

19 straight. You have not looked at any effects

20 from -- from any integration of DoubleClick for

21 Publisher with AdX; is that right?

22 MR. WOLIN: Objection to form.

23 THE WITNESS: Before the break, we were

24 talking about the availability of Google Ads

25 mainly via AdX.

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1 THE WITNESS: I did examine that, and  
 2 I'm looking for that proportion in the report in  
 3 Appendix G.  
 4 (Reviews document.)  
 5 Yeah. I don't seem to be able to find  
 6 that denominator here of the -- the amount of  
 7 spend in third-party exchanges and their growth  
 8 over time.  
 9 BY MR. ISAACSON:  
 10 Q. The waterfall we've been discussing  
 11 today -- and you discussed that in your 20  
 12 -- 2021 article that we looked at also, right?  
 13 A. Yes, we did somewhat.  
 14 Q. Were you familiar with the existence of  
 15 the waterfall before your art -- 2021 article?  
 16 A. Yes, I was familiar with the waterfall  
 17 before I wrote that article.  
 18 Q. The -- the waterfall was used generally  
 19 by sellers or sell-side platforms. It wasn't  
 20 exclusive to Google, correct?  
 21 MR. WOLIN: Objection to form.  
 22 THE WITNESS: I believe the waterfall  
 23 existed in DFP before it was purchased by Google.  
 24 BY MR. ISAACSON:  
 25 Q. And, well, looking at Paragraph 61 of

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1 your report, you say in the second sentence,  
 2 "Generally speaking, the waterfall describes a  
 3 setup where a seller or sell-side platform (in  
 4 this case, DFP)" . . . and then you go on to  
 5 describe it.  
 6 The waterfall was something that was  
 7 generally being used by sellers, sell-side  
 8 platforms, and including DFP, correct?  
 9 MR. WOLIN: Objection to form.  
 10 THE WITNESS: Yeah. The footnote also  
 11 confirms that. It was a traditional way of  
 12 accessing demand from several sources.  
 13 BY MR. ISAACSON:  
 14 Q. All right. The waterfall was industry  
 15 standard from about 2000 to 2010, correct?  
 16 MR. WOLIN: Objection to form.  
 17 THE WITNESS: The waterfall was  
 18 prevalent in the early days of remnant sales.  
 19 BY MR. ISAACSON:  
 20 Q. Okay. And what do you mean by "remnant  
 21 sales"?  
 22 A. Remnant is a term I use here, and also  
 23 in other places in the report, to refer to what  
 24 traditionally was remaining after satisfying  
 25 guaranteed contracts.

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1 Q. All right. And what was remaining was  
 2 space available for advertising that hadn't been  
 3 sold?  
 4 A. The remnant space of digital inventory,  
 5 yes.  
 6 Q. Okay. The waterfall enables publishers  
 7 to get a quick and reasonably high bid for an  
 8 impression.  
 9 MR. WOLIN: Objection to form.  
 10 BY MR. ISAACSON:  
 11 Q. Do you agree with that?  
 12 MR. WOLIN: Same objection.  
 13 THE WITNESS: In the early 2000s, as  
 14 display advertising was coming into the fore,  
 15 that was the case.  
 16 BY MR. ISAACSON:  
 17 Q. All right. And -- and that -- if you  
 18 look at your article, Exhibit 3, you wrote in  
 19 2021 at Page 889 -- where is this?  
 20 Okay. In the middle of the first column  
 21 on the left -- nope. That's not it.  
 22 Help me out here. It -- oh, there we  
 23 are.  
 24 So, yes, on the left-hand column, the  
 25 first full paragraph that begins "Early methods."

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1 A. Yes.  
 2 Q. And if you move down 10 or 12 lines you  
 3 start to see discussion of remnants and early  
 4 publisher networks.  
 5 A. Yes.  
 6 Q. And what you wrote there, "Early  
 7 publisher networks that process remnant inventory  
 8 prefer to send their requests for bids to only a  
 9 few reliable large advertising networks or  
 10 exchanges so as to get a quick and reasonably  
 11 high bid for the impression."  
 12 That's what you wrote about the  
 13 waterfall in 2021, correct?  
 14 A. Yes. That's what I wrote about early  
 15 publisher networks.  
 16 Q. All right. And I think you said that  
 17 the waterfall was developed by DoubleClick prior  
 18 to its acquisition by Google.  
 19 MR. WOLIN: Objection to form.  
 20 THE WITNESS: I believe I said that DFP  
 21 had implemented a waterfall prior to Google  
 22 acquiring it. I'm not sure if they developed it.  
 23 BY MR. ISAACSON:  
 24 Q. That's -- that's fair. So, right, the  
 25 waterfall existed in DoubleClick for Publishers



Page 122	<p>1 prior to its being acquired by Google?</p> <p>2 A. I believe that is the case. I have a</p> <p>3 citation for it.</p> <p>4 Q. Right.</p> <p>5 And dynamic allocation you say the same</p> <p>6 thing; that dynamic allocation existed in</p> <p>7 DoubleClick prior to Google acquiring it, right?</p> <p>8 MR. WOLIN: Objection to form.</p> <p>9 THE WITNESS: Dynamic allocation</p> <p>10 I think was reimplemented by Google after its</p> <p>11 acquisition; in other words, they redesigned it</p> <p>12 and deployed it. I remember --</p> <p>13 BY MR. ISAACSON:</p> <p>14 Q. So it existed in DoubleClick for</p> <p>15 Publisher -- I'm sorry. Start over.</p> <p>16 Dynamic allocation existed in</p> <p>17 DoubleClick prior to the acquisition by Google.</p> <p>18 After the acquisition, Google made design</p> <p>19 changes.</p> <p>20 MR. WOLIN: Objection to form.</p> <p>21 THE WITNESS: My understanding is that</p> <p>22 they reimplemented the whole thing. They -- they</p> <p>23 just started from scratch and rebuilt that</p> <p>24 feature.</p> <p>25 BY MR. ISAACSON:</p>	Page 124	<p>1 auctions.</p> <p>2 Q. I'm just referring to the phrase "The</p> <p>3 rise of header bidding in 2017." What rise of</p> <p>4 header bidding took place in 2017?</p> <p>5 MR. WOLIN: Objection to form.</p> <p>6 THE WITNESS: (Reviews document.)</p> <p>7 In Footnote 372 in Page 95, which</p> <p>8 explains some of the context leading up to</p> <p>9 Paragraph 195, there's an example of header</p> <p>10 bidding growing faster than AdX impressions in</p> <p>11 percentage in 2017, as reported in 2018.</p> <p>12 BY MR. ISAACSON:</p> <p>13 Q. All right. And then I think you've said</p> <p>14 this, but I just want to make sure, Paragraph 268</p> <p>15 of your opening report begins with the sentence,</p> <p>16 "Dynamic allocation was an existing feature of</p> <p>17 DoubleClick for Publisher when Google acquired</p> <p>18 DoubleClick in 2008."</p> <p>19 That was your -- that's a true</p> <p>20 statement, to your understanding, correct?</p> <p>21 A. Yes. 625, the footnote also verifies</p> <p>22 that.</p> <p>23 Q. All right. Now, you say -- at Paragraph</p> <p>24 71 of your report you refer to a preferential</p> <p>25 position -- positioning in bidding which AdX</p>
Page 123	<p>1 Q. The header bidding, as I understand it,</p> <p>2 was not developed until around 2014-2015; is that</p> <p>3 right?</p> <p>4 A. 2014 would be about right.</p> <p>5 Q. Okay. And then at Paragraph 195 of your</p> <p>6 report, you refer to the rise of header bidding</p> <p>7 in 2017. What do you mean by "the rise of header</p> <p>8 bidding"?</p> <p>9 A. Its rapid adoption in those two years.</p> <p>10 Q. I don't know which two years you're</p> <p>11 referring to because there's the year 2017 there.</p> <p>12 A. We talked about the header bidding being</p> <p>13 introduced by publishers in 2014-15. So it would</p> <p>14 be those intervening two years.</p> <p>15 Q. Right. But when you say the rise of</p> <p>16 header bidding in 2017, what are you referring</p> <p>17 to?</p> <p>18 A. Could you point me to the paragraph</p> <p>19 again? Sorry.</p> <p>20 Q. Paragraph 195.</p> <p>21 A. 195.</p> <p>22 As I explained in the next sentence,</p> <p>23 I'm talking about the -- the strong correlation</p> <p>24 between the adoption of header bidding and the</p> <p>25 eventual move of ad exchanges to first-price</p>	Page 125	<p>1 enjoyed through dynamic allocation.</p> <p>2 No. That's actually Paragraph 72.</p> <p>3 A. 72.</p> <p>4 Q. Yeah.</p> <p>5 A. Okay. Yes. I see that. Yeah.</p> <p>6 Q. And in this you say that, "Preferential</p> <p>7 position in bidding may have incentivized buyers</p> <p>8 to choose AdX over other exchanges," correct?</p> <p>9 A. That's what I wrote.</p> <p>10 Q. Right. And by "buyers," who were you</p> <p>11 referring to?</p> <p>12 A. The buyers that bid into the AdX</p> <p>13 auction.</p> <p>14 Q. Right. So through the technical design</p> <p>15 of dynamic allocation, Google was making itself</p> <p>16 more attractive to advertisers who wanted to bid</p> <p>17 on an ad exchange; is that right?</p> <p>18 MR. WOLIN: Objection to form.</p> <p>19 THE WITNESS: I was pointing to the</p> <p>20 technical design of the Publisher ad server,</p> <p>21 which is DFP, which helped the ad exchange of</p> <p>22 Google, AdX, obtain more customers.</p> <p>23 BY MR. ISAACSON:</p> <p>24 Q. All right. So, the technical design of</p> <p>25 the Publisher ad server, DFP, made Google more</p>

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1 attractive to advertisers who wanted to bid on an  
 2 ad exchange; is that right?  
 3 A. The --  
 4 MR. WOLIN: Objection to form.  
 5 THE WITNESS: The preferential position  
 6 that DFP placed AdX in in its waterfall made  
 7 Google's ad exchange more attractive to the  
 8 buyers in exchanges.  
 9 BY MR. ISAACSON:  
 10 Q. And the buyers in the exchanges are the  
 11 advertisers who wanted to bid on ads, right?  
 12 MR. WOLIN: Objection to form.  
 13 THE WITNESS: Among others who acted on  
 14 their -- on their behalf.  
 15 BY MR. ISAACSON:  
 16 Q. And that preferential position in  
 17 bidding was an existing feature of DoubleClick  
 18 for Publisher when Google acquired DoubleClick in  
 19 2008, correct?  
 20 MR. WOLIN: Objection to form.  
 21 THE WITNESS: AdX and DFP were not under  
 22 common ownership -- let me think about that.  
 23 Let's -- I have to think through the  
 24 -- the common ownership issues.  
 25 The -- the position of AdX to be always

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1 first in the DFP waterfall was something that was  
 2 established and continued until 2019.  
 3 BY MR. ISAACSON:  
 4 Q. All right. Was it -- was it a product  
 5 feature -- was pref -- the preferential position  
 6 in bidding that you've described an existing  
 7 feature of DoubleClick for Publisher when  
 8 Google acquired DoubleClick in 2008?  
 9 MR. WOLIN: Objection to form.  
 10 THE WITNESS: I'm not exactly sure about  
 11 this point, because my memory about AdX and DFP's  
 12 acquisition of Google are -- I'll have to jog  
 13 that memory.  
 14 But the report points to how, in a  
 15 traditional waterfall, the position in the  
 16 waterfall is based on expected prices on that  
 17 type of impression. The ordering is based on the  
 18 price you expect to get. That's what the  
 19 traditional waterfall design dictates.  
 20 The preferential position here is AdX  
 21 being first, irrespective of the historical  
 22 prices it produced on those line items.  
 23 BY MR. ISAACSON:  
 24 Q. All right. Do you deny that DoubleClick  
 25 had that preferential position prior to being

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1 acquired by Google?  
 2 MR. WOLIN: Objection to form.  
 3 THE WITNESS: I don't have enough  
 4 knowledge in that matter. I'd have to go back  
 5 and look at documents to see if that was the  
 6 case.  
 7 MR. WOLIN: When we get to a good spot,  
 8 Bill, we're ready to take a break for lunch.  
 9 MR. ISAACSON: Let me just do this  
 10 quickly. If it takes long I'll bail.  
 11 BY MR. ISAACSON:  
 12 Q. The -- in order to eliminate this  
 13 preferential feature that you're describing,  
 14 Google would have had to redesign the DoubleClick  
 15 technology it acquired to eliminate the product  
 16 -- to eliminate that preference as a product  
 17 feature. Am I correct about that?  
 18 MR. WOLIN: Objection to form.  
 19 THE WITNESS: As we were saying, DFP had  
 20 the waterfall before Google acquired it, and that  
 21 waterfall did not have any preferential positions  
 22 for any of the bidders into DFP.  
 23 BY MR. ISAACSON:  
 24 Q. Are you -- do you know whether there was  
 25 a preferential position prior to the acquisition

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1 by Google?  
 2 MR. WOLIN: Objection to form.  
 3 THE WITNESS: Yeah. I'm not totally  
 4 sure about AdX's, yeah. Mm-hmm.  
 5 BY MR. ISAACSON:  
 6 Q. And if you assume there was a  
 7 preferential position prior to the acquisition,  
 8 in order to get rid of that, Google would have  
 9 had to redesign the technology to get rid of that  
 10 preference, right?  
 11 MR. WOLIN: Objection to form.  
 12 THE WITNESS: That is one of the things  
 13 it could have done. There are many ways it could  
 14 have proceeded.  
 15 BY MR. ISAACSON:  
 16 Q. All right. You've been pointing to the  
 17 effects on rivals of that preference. In order  
 18 to get rid of that effect on rivals from that  
 19 preference, if you assume that preference existed  
 20 in DoubleClick for Publisher prior to  
 21 acquisition, Google, upon acquiring it, would  
 22 have had to redesign the system they acquired to  
 23 get rid of that preference; is that correct?  
 24 MR. WOLIN: Objection to form.  
 25 THE WITNESS: There are two points

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1 here. One is that the waterfall in DFP with  
 2 AdX's preferential position made AdX the only  
 3 exchange that always got to run a realtime  
 4 auction on the impressions that DFP was  
 5 supplying. That's the first point.  
 6 The second is around 2010 we  
 7 talked about OpenRTB, which was a technical  
 8 specification for any exchange to bid into a  
 9 publisher ad server. So that -- that is another  
 10 way in which Google might have evaluated its  
 11 technology.  
 12 BY MR. ISAACSON:  
 13 Q. All right. You're talking about a  
 14 technical redesign that Google did do in 2010,  
 15 and you're saying that, after acquiring  
 16 DoubleClick for Publishers, they could have done  
 17 that redesign then?  
 18 MR. WOLIN: Objection to form.  
 19 THE WITNESS: Google did not support  
 20 the 2010 OpenRTB. But one of the eight or so  
 21 originators of that technical specification was  
 22 AdMeld, which Google acquired.  
 23 BY MR. ISAACSON:  
 24 Q. All right. Let me just get back to my  
 25 question and see if I can get an answer.

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1 In order to get rid of the effect  
 2 on rivals from the preference you've been  
 3 describing, do you assume that preference  
 4 existed in DoubleClick for Publisher, prior to  
 5 acquisition, Google upon acquiring it would have  
 6 had to redesign the system in some manner in  
 7 order to get rid of that preference; is that  
 8 correct?  
 9 MR. WOLIN: Objection to form.  
 10 THE WITNESS: If we assume that AdX had  
 11 a preferential position before Google acquired  
 12 DFP, some product changes would be necessary in  
 13 DFP.  
 14 BY MR. ISAACSON:  
 15 Q. All right. And just in general when you  
 16 talk about this preferential position, you have  
 17 to redesign the product to get rid of that  
 18 preferential position, right?  
 19 MR. WOLIN: Objection to form.  
 20 THE WITNESS: That's why I was pointing  
 21 to OpenRTB. OpenRTB is an example of such a  
 22 design.  
 23 BY MR. ISAACSON:  
 24 Q. Right. And that takes some number of  
 25 engineers and some amount of work. Do you know

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1 how much work that involves?  
 2 MR. WOLIN: Objection to form.  
 3 THE WITNESS: I couldn't tell you  
 4 exactly.  
 5 BY MR. ISAACSON:  
 6 Q. And is there some -- so after the  
 7 acquisition in 2008, was there some time where  
 8 Google needed to do that redesign in order to  
 9 -- in order to eli -- in order to not have these  
 10 harmful facts? How long did they -- how fast did  
 11 they have to move?  
 12 MR. WOLIN: Objection to form.  
 13 THE WITNESS: I do not have an opinion  
 14 about that. I have not thought about it too  
 15 deeply.  
 16 BY MR. ISAACSON:  
 17 Q. Do you think they needed to move, like,  
 18 virtually immed -- as -- as soon as the  
 19 acquisition happened, did they need to start  
 20 redesigning it to get rid of that re -- to get  
 21 rid of that preferential position you described?  
 22 MR. WOLIN: Objection to form.  
 23 THE WITNESS: Again, I don't have an  
 24 opinion about that timeline.  
 25 MR. WOLIN: All right. Let's go off the

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1 record.  
 2 THE VIDEOGRAPHER: Off the record at  
 3 1:04.  
 4 (Lunch recess taken.)  
 5 THE VIDEOGRAPHER: Back on the record at  
 6 1:45.  
 7 BY MR. ISAACSON:  
 8 Q. One of the conclusions in your report is  
 9 you say that Google's preferential position in  
 10 bidding incentivized buyers to choose AdX over  
 11 rival exchanges because -- and that gave Google  
 12 scale advantage. Is that generally --  
 13 A. That is generally what I write in my  
 14 report, yeah.  
 15 Q. Right.  
 16 Is it -- do you agree that anytime  
 17 Google successfully designed AdX to incentivize  
 18 buyers to choose AdX over its rivals that would  
 19 give Google scale advantages?  
 20 MR. WOLIN: Objection to form.  
 21 THE WITNESS: When Google designed its  
 22 products to advantage AdX in such a way that  
 23 advertisers found -- and other buyers through AdX  
 24 found it attractive, it attracted scale for AdX,  
 25 yes.

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1 BY MR. ISAACSON:  
 2 Q. Right. Anytime Google designed AdX to  
 3 be more attractive, that would give Google  
 4 more -- AdX more scale.  
 5 MR. WOLIN: Objection to form.  
 6 THE WITNESS: I like that DFP made AdX  
 7 more attractive for buyers through AdX because of  
 8 its preferential position.  
 9 BY MR. ISAACSON:  
 10 Q. That's not my question. My question  
 11 is any time Google designed AdX to be move more  
 12 attractive to buyers, that would give Google  
 13 -- Google's AdX more scale, right.  
 14 MR. WOLIN: Objection to form.  
 15 THE WITNESS: Generally speaking, when  
 16 a product is more attractive to its buyers, it  
 17 attracts more participants, which is one measure  
 18 of scale.  
 19 BY MR. ISAACSON:  
 20 Q. And to avoid giving Google scale  
 21 advantages over its competitors, was it  
 22 necessary for Google to design its system  
 23 to not be attractive to buyers?  
 24 MR. WOLIN: Objection to form.  
 25 THE WITNESS: My opinion was not about

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1 the attractiveness of Google's products. It  
 2 was more about the preferencing of AdX by DFP,  
 3 giving AdX this advantage and attractiveness to  
 4 its buyers.  
 5 BY MR. ISAACSON:  
 6 Q. Yes. The preferencing made AdX more  
 7 attractive to buyers. That was your conclusion,  
 8 correct?  
 9 MR. WOLIN: Objection --  
 10 THE WITNESS: Yes.  
 11 MR. WOLIN: -- to form.  
 12 THE WITNESS: Yes.  
 13 BY MR. ISAACSON:  
 14 Q. If at any time AdX was made more  
 15 attractive to buyers, then Google would gain  
 16 scale and that would benefit it versus rivals,  
 17 correct?  
 18 MR. WOLIN: Objection to form.  
 19 THE WITNESS: As I was saying earlier,  
 20 generally speaking, attractive products increase  
 21 the scale.  
 22 BY MR. ISAACSON:  
 23 Q. Right. And -- and to avoid that  
 24 happening and -- and to avoid disadvantaging  
 25 rivals, Google would have to design its system to

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1 be less attractive to buyers, right?  
 2 MR. WOLIN: Objection to form.  
 3 THE WITNESS: That was not in my  
 4 opinion.  
 5 BY MR. ISAACSON:  
 6 Q. Well, how else was Google going  
 7 to avoid achieving scale to the disadvantage of  
 8 its rivals other than designing less-attractive  
 9 products?  
 10 MR. WOLIN: Objection to form.  
 11 THE WITNESS: There are many ways in  
 12 which an ad tech product can be made attractive.  
 13 I was calling out the specific preferences within  
 14 Google's system that made some of them  
 15 attractive.  
 16 BY MR. ISAACSON:  
 17 Q. So some features that make a system  
 18 attractive to buyers are okay in your mind, and  
 19 some aren't?  
 20 MR. WOLIN: Objection to form.  
 21 THE WITNESS: I have no opinion about  
 22 specific features and other specific features.  
 23 BY MR. ISAACSON:  
 24 Q. All right. And returning to my  
 25 question, can you name any way that Google

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1 could avoid achieve -- achieving scale to the  
 2 disadvantage of its rivals other than designing a  
 3 system less attractive to buyers?  
 4 MR. WOLIN: Objection; form.  
 5 THE WITNESS: Could you repeat the first  
 6 phrase?  
 7 BY MR. ISAACSON:  
 8 Q. Can you name any way that Google could  
 9 achieve -- well, I garbled that question too, so  
 10 that didn't help.  
 11 Well, no, I got it right.  
 12 Can you name any way that Google  
 13 could avoid gaining scale for itself to the  
 14 disadvantage of its rivals other than designing a  
 15 system less attractive to buyers?  
 16 MR. WOLIN: Objection to form.  
 17 THE WITNESS: Hmm. That is a quite  
 18 contorted question there.  
 19 Could I name any way in which Google  
 20 could not disadvantage its rivals and build  
 21 scale?  
 22 BY MR. ISAACSON:  
 23 Q. Yeah.  
 24 A. More efficient conversion?  
 25 Q. Well, no, no, no. Actually, that's not

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1 the question.  
 2 Could you name a way Google could not  
 3 disadvantage and ri -- disadvantage its rivals  
 4 and build scale other than producing a lower-qual  
 5 -- a less-attractive product.  
 6 MR. WOLIN: Objection to form.  
 7 THE WITNESS: I'm sorry. I really did  
 8 not get the implication here.  
 9 BY MR. ISAACSON:  
 10 Q. So the implic -- I'm not trying to have  
 11 implications here.  
 12 You've said that -- that Google, by  
 13 providing this preference, created something that  
 14 was more attractive to buyers and builds scale;  
 15 and that that disadvantaged rivals. And you said  
 16 that, generally, if Google makes the product more  
 17 attractive, that will build scale and  
 18 disadvantage rivals.  
 19 What I want to know, if you want to  
 20 achieve the opposite result, if you want to not  
 21 disadvantage rivals, or advantage rivals, okay,  
 22 could you think of any way of doing that if  
 23 you're Google other than designing a  
 24 less-attractive product?  
 25 MR. WOLIN: Objection to form.

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1 THE WITNESS: I really did not consider  
 2 deeply the various ways in which Google could not  
 3 disadvantage rivals. I looked at the conducts  
 4 as -- you know, as the evidence indicates, and I  
 5 tried to opine on the -- the preferential  
 6 treatment, for example, that I explained. I  
 7 really did not get into thinking about ways of  
 8 not disadvantaging rivals. That's --  
 9 BY MR. ISAACSON:  
 10 Q. All right. Thank you.  
 11 Now, with regards to the waterfall,  
 12 do you -- you agree that publishers set the order  
 13 that exchanges were called in the waterfall?  
 14 MR. WOLIN: Objection to form.  
 15 THE WITNESS: In the traditional  
 16 waterfall, that was generally true.  
 17 BY MR. ISAACSON:  
 18 Q. Yeah. I'm talking about the traditional  
 19 waterfall right now.  
 20 And under the traditional wat --  
 21 waterfall, publishers would rank exchanges or  
 22 other purchasers according to a priority,  
 23 correct?  
 24 MR. WOLIN: Objection to form.  
 25 THE WITNESS: Yes. And the priority

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1 would typically depend on the price the purchaser  
 2 fetched.  
 3 BY MR. ISAACSON:  
 4 Q. All right. And it's the publisher that  
 5 chose that price, correct?  
 6 MR. WOLIN: Objection to form.  
 7 THE WITNESS: It was the publisher or a  
 8 system that was representing them by -- selling  
 9 on their behalf.  
 10 BY MR. ISAACSON:  
 11 Q. Right. And if the publ -- and also  
 12 the publisher had the choice of not selecting by  
 13 price; the publisher or their agent could name  
 14 the order of exchanges in the waterfall.  
 15 MR. WOLIN: Objection to form.  
 16 THE WITNESS: That is a technical  
 17 possibility.  
 18 BY MR. ISAACSON:  
 19 Q. And you agree that the waterfall was  
 20 inefficient?  
 21 MR. WOLIN: Objection to form.  
 22 THE WITNESS: That is my opinion in the  
 23 report.  
 24 BY MR. ISAACSON:  
 25 Q. All right. And -- and dynamic

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1 allocation allowed AdX advertisers to compete for  
 2 impressions simultaneously before the waterfall  
 3 was run; is that correct?  
 4 A. Dynamic allocation only allowed AdX  
 5 buyers to compete simultaneously, not all buyers  
 6 buying off of DFP.  
 7 Q. Right. And so Google, through dynamic  
 8 allocation, allowed the buyers on AdX, which is a  
 9 Google product, to participate in a si -- in a si  
 10 -- simultaneous competition for the impressions  
 11 before the waterfall was run; is that correct?  
 12 MR. WOLIN: Objection to form.  
 13 THE WITNESS: I wouldn't characterize  
 14 it as "before the waterfall was run." AdX was  
 15 the first in that waterfall order.  
 16 BY MR. ISAACSON:  
 17 Q. And you think that first in the order is  
 18 not before?  
 19 A. First in the order is first in the  
 20 order.  
 21 Q. Yeah. Okay.  
 22 The -- and -- and what you're saying is  
 23 that if buyers were in exchanges that weren't  
 24 Google products, they should have been in there  
 25 at the same time as the Google customers.

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1 MR. WOLIN: Objection to form.  
 2 THE WITNESS: I don't have any opinion  
 3 about that.  
 4 BY MR. ISAACSON:  
 5 Q. You don't have any opinion about  
 6 that, but that is what you are saying was the  
 7 preference. The preference was Google was giving  
 8 a preference to its own customers and not giving  
 9 a preference to customers working in -- in  
 10 exchanges of its rivals.  
 11 MR. WOLIN: Objection to form.  
 12 THE WITNESS: I was pointing out the  
 13 difference from the traditional waterfall where  
 14 the ordering is based on historical prices.  
 15 BY MR. ISAACSON:  
 16 Q. But the preference, sir, was to Google  
 17 customers over customers of Google competitors,  
 18 correct?  
 19 MR. WOLIN: Objection to form.  
 20 THE WITNESS: In this case, the  
 21 preference was to AdX.  
 22 BY MR. ISAACSON:  
 23 Q. It was to Google customers in AdX,  
 24 correct?  
 25 MR. WOLIN: Objection to form.

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1 THE WITNESS: It was to the buyers of  
 2 impressions through AdX.  
 3 BY MR. ISAACSON:  
 4 Q. Right. And those are buyers who are  
 5 Google customers in AdX, correct?  
 6 MR. WOLIN: Objection to form.  
 7 THE WITNESS: Those are the customers of  
 8 AdX.  
 9 BY MR. ISAACSON:  
 10 Q. All right. And you mentioned when AdX  
 11 was relaunched, I think -- when -- after the  
 12 acquisition by DoubleClick, Google relaunched  
 13 AdX with real-time bidding, didn't it?  
 14 MR. WOLIN: Objection to form.  
 15 THE WITNESS: I think that's generally  
 16 correct. I mentioned that somewhere.  
 17 BY MR. ISAACSON:  
 18 Q. Right. And there were a few companies  
 19 during that period, 2008, 2009, 2010, who  
 20 launched real-time bidding at about that -- that  
 21 time period. There was a handful of companies,  
 22 including Google, that did that, right?  
 23 MR. WOLIN: Objection to form.  
 24 THE WITNESS: That's generally correct,  
 25 yeah.

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1 BY MR. ISAACSON:  
 2 Q. Right. So one of them was OpenX; one of  
 3 them was PubMatic; another one was Google,  
 4 correct?  
 5 MR. WOLIN: Objection to form.  
 6 THE WITNESS: I think that's about  
 7 right, yeah.  
 8 BY MR. ISAACSON:  
 9 Q. Now, in your discussion of header  
 10 bidding, you discuss the prices that publishers  
 11 who used header bidding would put into DFP.  
 12 A. Yes, I do discuss that.  
 13 Q. Okay. And if you look at your rebuttal  
 14 report at Paragraph 47, it is correct that  
 15 publishers got to choose what price to put into  
 16 DFP following the header bidding auction.  
 17 Correct?  
 18 MR. WOLIN: Objection to form.  
 19 THE WITNESS: That's also generally  
 20 correct, yes.  
 21 BY MR. ISAACSON:  
 22 Q. And you say that "Google documents  
 23 suggest that publishers could, and sometimes did,  
 24 inflate the header bids that they entered into  
 25 DFP," correct?

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1 A. That's generally correct. But I point  
 2 out in the rest of the sentence that Google did  
 3 not know how often they did that.  
 4 Q. Correct. And that's what I was about to  
 5 get to.  
 6 So have you done any investigation as  
 7 to how often publishers inflated header bids that  
 8 they put into DFP, as opposed to putting in as a  
 9 reserve the result of the header bid auction.  
 10 MR. WOLIN: Objection to form.  
 11 THE WITNESS: The documentary evidence  
 12 I've seen particularly about the implementation  
 13 of header bidding through Google's infrastructure  
 14 suggests that publishers did use, mostly, the  
 15 header bidding price that they fetched outside.  
 16 BY MR. ISAACSON:  
 17 Q. You're saying that you've seen that in a  
 18 document?  
 19 A. In several documents describing those  
 20 implementations.  
 21 Q. All right. The -- and you were relying  
 22 on those documents for your conclusion about  
 23 that?  
 24 MR. WOLIN: Objection to form.  
 25 THE WITNESS: Additionally, I also cite

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1 Q. And what you have said is that Google  
 2 -- while that's not what Google launched, Google  
 3 explored applying Project Bell to passback  
 4 publishers, correct?  
 5 A. Yes. I have written that Google  
 6 explored.  
 7 Q. All right. And so what you found  
 8 through reviewing Google documents was that  
 9 Google knew how to disadvantage passback  
 10 mediation, but it did not go forward and do that,  
 11 correct?  
 12 MR. WOLIN: Objection; form.  
 13 THE WITNESS: The Google documents that  
 14 I reviewed and I cite here describe the design  
 15 of experiments of identifying these passback  
 16 publishers and doing what is called unconstrained  
 17 pool-building. That's getting as much subsidies,  
 18 if you will, from these publishers and using them  
 19 on non-passback publishers called first-call  
 20 publishers.  
 21 In fact, the name Project Bell owes its  
 22 origin to the person who made the first call in  
 23 a -- in a sort of allusion to this distinction  
 24 between first-call versus passback.  
 25 BY MR. ISAACSON:

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1 Q. And through those experiments, Google  
 2 learned how it could disadvantage passback  
 3 mediation, but it did not go forward with that,  
 4 correct?  
 5 MR. WOLIN: Objection to form.  
 6 THE WITNESS: I've only seen evidence  
 7 of these experiments where it explored and  
 8 understood the effects of this exploration.  
 9 I've not seen a fully launched version in my  
 10 examination of disadvantaging passback mediation.  
 11 BY MR. ISAACSON:  
 12 Q. A fully -- you haven't seen a fully  
 13 launched version of what?  
 14 A. Of a -- a version of some version of  
 15 Project Bell that disadvantaged passback  
 16 publishers.  
 17 Q. So what you saw was that Google  
 18 conducted experiments that -- that helped them  
 19 to understand how they might build a system to  
 20 disadvantage passback mediation, and then Google  
 21 went forward with Project Bell Version 2 which  
 22 did not do that, correct?  
 23 MR. WOLIN: Objection to form.  
 24 THE WITNESS: What I saw was a  
 25 modification of its buy-side DRS products

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1 that came out before it named Project Bell,  
 2 insinuating the distinction between first-call  
 3 and passback publishers. And I saw the  
 4 experiments that they ran on 20 publishers.  
 5 And then I -- I do see that in the fully launched  
 6 version, V2, in 2016, two years after these  
 7 experiments were run, the program only applied to  
 8 the multi-call mediators.  
 9 BY MR. ISAACSON:  
 10 Q. So I'm concerned that -- and I know  
 11 you're trying to explain this -- that a Court's  
 12 not going to understand what you're saying; so  
 13 I'm going to go over this again, because I just  
 14 want to get down to the simple point Google did  
 15 conduct experiments which gave them information  
 16 about how they could possibly impair passback  
 17 mediation, correct?  
 18 MR. WOLIN: Objection to form.  
 19 THE WITNESS: The experiments actually  
 20 carried out the application of this optimization  
 21 on the experimented publishers, and from that  
 22 it -- it concluded that it would be effective,  
 23 yeah.  
 24 BY MR. ISAACSON:  
 25 Q. Okay. So Google did experiments showing

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1 a method that would be effective impairing --  
 2 impairing passback mediation. But when it went  
 3 forward with Project Bell, it did not implement  
 4 any impairments on passback mediation, correct?  
 5 MR. WOLIN: Objection to form.  
 6 THE WITNESS: Google implemented the  
 7 experiments on passback mediation, but I have not  
 8 seen a fully launched version disadvantaging  
 9 passback publishers in Project Bell Version 2 in  
 10 2016.  
 11 BY MR. ISAACSON:  
 12 Q. Now, the other feature that you just  
 13 mentioned was -- has to do with multi-call.  
 14 Now, multi-calling is a practice in  
 15 which publishers fish for better prices by  
 16 calling AdX multiple times, right?  
 17 MR. WOLIN: Objection to form.  
 18 THE WITNESS: That is the context in  
 19 which I've encountered it.  
 20 BY MR. ISAACSON:  
 21 Q. And when publishers call AdX multiple  
 22 times, they gradually lower their asking price  
 23 until they submit a price for just below the  
 24 highest bid. Isn't that generally the way it  
 25 works?

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1 MR. WOLIN: Objection to form.  
 2 THE WITNESS: That's, roughly speaking,  
 3 how it works. These multiple calls may have  
 4 different sets of buyers, so it may not be  
 5 exactly the same.  
 6 BY MR. ISAACSON:  
 7 Q. Right. And the objective of  
 8 multi-calling was price inflation, right? It was  
 9 a price inflation tactic.  
 10 MR. WOLIN: Objection to form.  
 11 THE WITNESS: It's characterized as  
 12 "price fishing," which means fishing for the best  
 13 price that they could fetch.  
 14 BY MR. ISAACSON:  
 15 Q. Right. But the -- it was also described  
 16 as a price inflation tactic, right?  
 17 MR. WOLIN: Objection to form.  
 18 BY MR. ISAACSON:  
 19 Q. Maybe if you look at Footnote 256 of  
 20 your report, at Paragraph 128.  
 21 A. Yes. That's how the Google document  
 22 characterizes it: Price inflation tactics by  
 23 publishers and exchanges.  
 24 Q. And you don't deny that multi-calling  
 25 as a practice would tend to raise prices for

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1 advertisers, do you?  
 2 MR. WOLIN: Objection to form.  
 3 THE WITNESS: Generally speaking, that  
 4 would be the case.  
 5 BY MR. ISAACSON:  
 6 Q. Right. And you're aware that  
 7 multi-calling also raises costs for advertisers  
 8 by creating multiple redundant queries that are  
 9 not valuable for the advertiser to have to sort  
 10 through?  
 11 MR. WOLIN: Objection to form.  
 12 THE WITNESS: It does increase the  
 13 work involved by having many calls for the same  
 14 impression. So in that sense it would be costly  
 15 for everyone involved in processing that  
 16 information.  
 17 BY MR. ISAACSON:  
 18 Q. All right. Would you agree with the  
 19 statement that choosing for which request to  
 20 compete is an economically significant cost for a  
 21 bidder?  
 22 MR. WOLIN: Objection to form.  
 23 THE WITNESS: Generally speaking, that  
 24 is true.  
 25 BY MR. ISAACSON:

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1 Q. And would you agree with the statement  
 2 that bidding for an impression is costly?  
 3 MR. WOLIN: Objection to form.  
 4 THE WITNESS: Bidding for an impression,  
 5 including deciding how much that bid should be,  
 6 is part of the cost of engaging in buying.  
 7 BY MR. ISAACSON:  
 8 Q. And would you agree with the statement  
 9 that screening for the right impressions by  
 10 bidders takes up valuable computing resources?  
 11 MR. WOLIN: Objection to form.  
 12 THE WITNESS: Again, generally speaking,  
 13 finding the right set of buyers to choose in an  
 14 auction is -- it takes some effort.  
 15 BY MR. ISAACSON:  
 16 Q. And you would agree that multi-calling  
 17 was harmful to advertisers, correct?  
 18 MR. WOLIN: Objection to form.  
 19 THE WITNESS: Multi-calling was mainly  
 20 a concern for publishers in terms of trying to  
 21 find the best price that they could for the  
 22 impressions.  
 23 BY MR. ISAACSON:  
 24 Q. That wasn't my question.  
 25 Do you agree multi-calling was harmful

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1 to advertisers?  
 2 MR. WOLIN: Objection to form.  
 3 THE WITNESS: Inasmuch as the additional  
 4 load that we just talked about that these  
 5 multiple calls imposes on the ad tech system,  
 6 multi-calling was generally not useful for the  
 7 whole system.  
 8 BY MR. ISAACSON:  
 9 Q. So -- and that's a fair point.  
 10 It wasn't just -- multi-calling was not  
 11 just harmful to advertisers. It was harmful to  
 12 the whole ad tech system, correct?  
 13 MR. WOLIN: Objection to form.  
 14 THE WITNESS: Multi-calling as an  
 15 effort by publishers to find the best price for  
 16 themselves through the so-called "price fishing"  
 17 did include additional load on all the systems  
 18 involved in processing that impression.  
 19 BY MR. ISAACSON:  
 20 Q. Right. And that was generally not good  
 21 for the whole ad tech system, correct?  
 22 MR. WOLIN: Objection to form.  
 23 THE WITNESS: In general, multi-calling  
 24 introduced redundancies in the ad tech ecosystem.  
 25 BY MR. ISAACSON:



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1 integrated data mining and analytical decision  
 2 tools in software in order to understand  
 3 customers.  
 4 MR. WOLIN: Objection to form.  
 5 THE WITNESS: Yes. We were doing  
 6 that with the example of customer relationship  
 7 management systems, like Salesforce, which was  
 8 the other example.  
 9 BY MR. ISAACSON:  
 10 Q. Right. And then in the next paragraph  
 11 you say, CCM, which is -- what did we say CCM?  
 12 A. The title of the book.  
 13 "Customer-Centric Marketing."  
 14 Q. Thank you.  
 15 "The Customer-Centric Marketing  
 16 decision-making paradigm calls for even more  
 17 advanced software applications that integrate  
 18 data mining and analytical decision tools more  
 19 seamlessly." In other words, you need software  
 20 and software applications that are going to run  
 21 seamlessly and work together, right?  
 22 MR. WOLIN: Objection to form.  
 23 THE WITNESS: The main point of this  
 24 sentence is the integration of data mining and --  
 25 BY MR. ISAACSON:

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1 Q. Well, I'm --  
 2 MR. WOLIN: Let him finish the answer,  
 3 please.  
 4 MR. ISAACSON: No. I would like him to  
 5 answer the question.  
 6 BY MR. ISAACSON:  
 7 Q. So I didn't ask you what the main point  
 8 of the sentence is. What I want to know is you  
 9 -- based on what you write here about "the need  
 10 for integrated data mining and analytical  
 11 decision tools acting seamlessly," do you agree  
 12 that you need those things to -- to work  
 13 seamlessly and work together in order to get  
 14 this -- to process this data and get the  
 15 information that you want people to have?  
 16 MR. WOLIN: Objection to form.  
 17 THE WITNESS: We advocate the  
 18 integration of data mining and decision-making  
 19 tools.  
 20 BY MR. ISAACSON:  
 21 Q. Right. And that requires more scale and  
 22 more data, right?  
 23 MR. WOLIN: Objection to form.  
 24 THE WITNESS: Generally speaking, more  
 25 scale is helpful in these practices.

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1 BY MR. ISAACSON:  
 2 Q. The more scale you have, the better  
 3 you're gonna be able to serve these customers.  
 4 MR. WOLIN: Objection to form.  
 5 THE WITNESS: The more scale you have,  
 6 you are able to improve the accuracy of these  
 7 data mining tools, which then, integrated with  
 8 decision making tools, also make better  
 9 decisions.  
 10 BY MR. ISAACSON:  
 11 Q. All right. Let's move to the topic of  
 12 dynamic -- sell-side dynamic revenue share.  
 13 Okay?  
 14 And this is where -- just generally  
 15 you'll recall just so you're oriented about our  
 16 topic, Transactions -- the revenue share was  
 17 being modified in different transactions. And  
 18 you go through more specifics. I just wanted you  
 19 oriented to topic.  
 20 A. Yeah. And that's true of both the  
 21 buy-side and sell-side revenue share adjustments.  
 22 Q. Okay. Do you agree that sell-side  
 23 dynamic revenue share could increase matches  
 24 between advertisers and publishers that would  
 25 cause AdX bidders to clear floor price in an

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1 auction, a floor price that would not otherwise  
 2 have been met?  
 3 MR. WOLIN: Objection to form.  
 4 THE WITNESS: Generally speaking, that  
 5 is the case.  
 6 BY MR. ISAACSON:  
 7 Q. Okay. Do you agree that sell-side  
 8 dynamic revenue share can expand output if it is  
 9 used when it causes AdX bidders to clear floor  
 10 price in an auction, a floor price that would not  
 11 have otherwise have been met?  
 12 MR. WOLIN: Objection to form.  
 13 THE WITNESS: Floor prices that  
 14 are cleared by sell-side DRS that would not  
 15 otherwise have been cleared does expand the  
 16 output of AdX.  
 17 BY MR. ISAACSON:  
 18 Q. And do you understand -- understand  
 19 output to be a term used in economics and  
 20 antitrust economics?  
 21 MR. WOLIN: Objection to form.  
 22 THE WITNESS: I was understanding output  
 23 here simply to be the total number of cleared  
 24 transactions.  
 25 BY MR. ISAACSON:

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1 Q. Okay. The -- by the way, do you  
 2 consider yourself an expert in industrial  
 3 organization?  
 4 A. I'm not an expert in IO.  
 5 Q. Is it your view that dynamic revenue  
 6 share did not increase output?  
 7 MR. WOLIN: Objection to form.  
 8 THE WITNESS: And how are you meaning  
 9 "output" in this question?  
 10 BY MR. ISAACSON:  
 11 Q. However you want to mean "output."  
 12 MR. WOLIN: Objection to form.  
 13 THE WITNESS: So the question would be?  
 14 BY MR. ISAACSON:  
 15 Q. Is it your view that sell-side dynamic  
 16 revenue share did not increase output?  
 17 MR. WOLIN: Objection to form.  
 18 THE WITNESS: My view is that sell-side  
 19 dynamic revenue sharing sometimes increase the  
 20 volume of impressions won by AdX.  
 21 BY MR. ISAACSON:  
 22 Q. Okay. And so it would not be your  
 23 -- you don't have an opinion that sell-side  
 24 dynamic revenue share did not increase output?  
 25 MR. WOLIN: Objection to form.

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1 BY MR. ISAACSON:  
 2 Q. There's a double-negative in there, but  
 3 the -- so I can try it again, but I think you  
 4 know where I'm going.  
 5 Would you state an opinion -- would you  
 6 have an opinion today that sell-side dynamic  
 7 revenue share did not increase output?  
 8 MR. WOLIN: Objection to form.  
 9 THE WITNESS: No, I do not have an  
 10 opinion about that.  
 11 BY MR. ISAACSON:  
 12 Q. All right. And have you seen documents  
 13 showing that -- Google documents showing that dyn  
 14 -- that sell-side dynamic revenue share increased  
 15 -- increased the overall match rate for AdX  
 16 publishers?  
 17 MR. WOLIN: Objection to form.  
 18 THE WITNESS: My general recollection  
 19 is that is the case; that there were additional  
 20 transactions cleared.  
 21 BY MR. ISAACSON:  
 22 Q. All right. And you did not see any  
 23 document that indicated to you that sell-side  
 24 dynamic revenue share did not increase the  
 25 overall match rate, correct?

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1 MR. WOLIN: Objection to form.  
 2 THE WITNESS: That -- that is generally  
 3 the case, as well, yeah.  
 4 BY MR. ISAACSON:  
 5 Q. All right. And did you see documents  
 6 -- Google documents that indicated that sell-side  
 7 dynamic revenue share increased publisher  
 8 revenues from AdX?  
 9 MR. WOLIN: Objection to form.  
 10 THE WITNESS: In general, sell-side  
 11 dynamic revenue sharing increased the portion  
 12 that was sold through AdX.  
 13 BY MR. ISAACSON:  
 14 Q. And did that increase publisher revenue  
 15 on AdX?  
 16 MR. WOLIN: Objection to form.  
 17 THE WITNESS: That may have been the  
 18 case. Part of the revenue may have been coming  
 19 from a different source prior to.  
 20 BY MR. ISAACSON:  
 21 Q. All right. And did you see documents  
 22 -- Google documents indicating that publishers  
 23 on AdX were benefiting from sell-side dynamic  
 24 revenue share through increased revenues?  
 25 MR. WOLIN: Objection to form.

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1 THE WITNESS: There may have been  
 2 documents like that. I'll have to look at the  
 3 appendix, perhaps.  
 4 BY MR. ISAACSON:  
 5 Q. Okay. And you did not see any Google  
 6 documents that said that publishers on AdX were  
 7 losing revenues as a result of sell-side dynamic  
 8 revenue share, correct?  
 9 MR. WOLIN: Objection to form.  
 10 THE WITNESS: Yeah. I'm not finding  
 11 any documents that talk about publisher revenue  
 12 changes.  
 13 BY MR. ISAACSON:  
 14 Q. By the way, how did you go about looking  
 15 for documents for your report?  
 16 A. I -- I tried -- I first read the  
 17 complaint, and I narrowed in on the conducts  
 18 and the ones that involved these optimization  
 19 problems associated with them. And then I -- I  
 20 requested documents, particularly design and  
 21 technical documents that would explain these  
 22 conducts.  
 23 Q. And was that from the 12 people at the  
 24 Brattle Group working with you?  
 25 A. Before they were engaged, I was doing

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1 this on my own with my contacts at DOJ. Later  
 2 they did help me with that, yeah.  
 3 Q. Now, your report expresses the  
 4 opinion that sell-side dynamic revenue share  
 5 disadvantaged rival ad exchanges. Is it your  
 6 view that Google -- even if sell-side dynamic  
 7 revenue share was increasing matches between  
 8 advertisers and publishers, even if it was  
 9 creating more money for publishers, that  
 10 sell-side dynamic revenue share should not have  
 11 gone forward because it was disadvantaging  
 12 Google's rivals?  
 13 MR. WOLIN: Objection to form.  
 14 THE WITNESS: I don't have an opinion  
 15 about whether it should or should not have gone  
 16 forward.  
 17 BY MR. ISAACSON:  
 18 Q. Well, when you say that sell-side DRS,  
 19 Dynamic Revenue Share, disadvantaged rivals, you  
 20 are saying that it disadvantaged rivals at the  
 21 same time as you acknowledge it did increase  
 22 match rates between advertisers and publishers  
 23 and did increase publisher revenues, correct.  
 24 MR. WOLIN: Objection to form.  
 25 THE WITNESS: I was pointing out the

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1 disadvantage to the rivals while also citing to  
 2 the changes in publisher revenue when  
 3 appropriate.  
 4 BY MR. ISAACSON:  
 5 Q. And the changes in publisher revenue  
 6 that you're just referring to are increases in  
 7 publisher revenue, correct?  
 8 A. That was generally the case, yeah.  
 9 Q. Right. And -- all right.  
 10 MR. WOLIN: Can we take a break if  
 11 you're at a good spot?  
 12 MR. ISAACSON: Sure.  
 13 MR. WOLIN: We've been going for over an  
 14 hour.  
 15 MR. ISAACSON: That's fine.  
 16 MR. WOLIN: Let's go off the record.  
 17 THE VIDEOGRAPHER: We're off the record  
 18 at 2:54.  
 19 (Recess taken.)  
 20 THE VIDEOGRAPHER: Back on the record at  
 21 3:07.  
 22 BY MR. ISAACSON:  
 23 Q. Now, in your opening report, you say  
 24 that "Rival exchanges have not been able to  
 25 implement similar features to dynamic revenue

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1 share without reducing their average fees due to  
 2 a lack of scale."  
 3 Do you remember -- generally remember  
 4 that topic?  
 5 A. I remember that with respect to  
 6 sell-side dynamic revenue share.  
 7 Q. Yeah. Yeah. We're still on sell-side.  
 8 A. Okay.  
 9 Q. Now, you did not do any investigation  
 10 about the specific sizes or scale of any rival  
 11 exchanges to AdX, correct?  
 12 MR. WOLIN: Objection to form.  
 13 THE WITNESS: I did not undertake a  
 14 quantification of the -- the reduction in scale.  
 15 BY MR. ISAACSON:  
 16 Q. You don't know the scale, for example,  
 17 of any rival exchange to AdX?  
 18 MR. WOLIN: Objection to form.  
 19 THE WITNESS: Generally speaking, I know  
 20 that AdX had about 60 percent of the market. I  
 21 cite it somewhere. And so that already makes  
 22 every other rival smaller than it.  
 23 BY MR. ISAACSON:  
 24 Q. But in terms of the amount of data that  
 25 rivals have, you don't know what scale of data

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1 any rival of -- of AdX had, correct?  
 2 MR. WOLIN: Objection to form.  
 3 THE WITNESS: Again, using that  
 4 60-person number and an estimate of the daily  
 5 impressions cleared, one could fathom an  
 6 estimate.  
 7 BY MR. ISAACSON:  
 8 Q. But you've not looked at any specific  
 9 rival exchange to see how much data they have?  
 10 MR. WOLIN: Objection to form.  
 11 THE WITNESS: I have not examined  
 12 specific rivals' data in this case.  
 13 BY MR. ISAACSON:  
 14 Q. And you don't know any rival exchange  
 15 that has not been able to implement a program  
 16 like sell-side dynamic revenue share due to  
 17 limits on their scale.  
 18 MR. WOLIN: Objection to form.  
 19 THE WITNESS: I cite deposition  
 20 testimony from one rival that I remember.  
 21 BY MR. ISAACSON:  
 22 Q. Yes, you do. That's Paragraph 162, Note  
 23 341, --  
 24 A. Thank you.  
 25 [REDACTED]

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1 is correct, yeah.  
 2 BY MR. ISAACSON:  
 3 Q. And what do you mean by a "clean  
 4 second-price auction"?  
 5 A. A clean second-price auction is one  
 6 that prices the value of the impressions sold,  
 7 according to the rules of a second-price auction;  
 8 namely, the floor or the second-highest bidder,  
 9 whichever was higher.  
 10 Q. Right. And the -- and if it's not a  
 11 clean second-price auction, are those sometimes  
 12 referred to as dirty auctions?  
 13 MR. WOLIN: Objection to form.  
 14 THE WITNESS: You could call it that,  
 15 just as a manner of speaking.  
 16 BY MR. ISAACSON:  
 17 Q. Okay. And what Poirot did was run  
 18 experiments on traffic to determine an amount by  
 19 which bids should be reduced in second-price  
 20 auctions that were not clean, that were  
 21 due -- that were dirty, right?  
 22 MR. WOLIN: Objection to form.  
 23 THE WITNESS: Poirot determined shading  
 24 amounts for exchanges that were not running these  
 25 clean second-price auctions, correct.

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1 BY MR. ISAACSON:  
 2 Q. And just for other people, "shading"  
 3 sounds shady itself. Shading just means you're  
 4 adjusting your bidding, right?  
 5 MR. WOLIN: Objection to form.  
 6 THE WITNESS: Shading in the sense of a  
 7 factor of less than one, --  
 8 BY MR. ISAACSON:  
 9 Q. Right.  
 10 A. -- that would be shading, like, versus  
 11 boosting. I think that's where that language  
 12 comes from.  
 13 Q. There's nothing negative about shading  
 14 just as a term --  
 15 MR. WOLIN: Ob --  
 16 THE WITNESS: Not at all. It has  
 17 nothing to do with light either, yeah.  
 18 BY MR. ISAACSON:  
 19 Q. And so DV360 altered bids in exchanges  
 20 that ran what could be called "dirty auctions."  
 21 MR. WOLIN: Objection to form.  
 22 THE WITNESS: DV360 perform this bid  
 23 shading on auctions that were not running clean  
 24 second-price auctions.  
 25 BY MR. ISAACSON:

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1 Q. And DV360 didn't alter bids in exchanges  
 2 that ran clean second-price auctions.  
 3 MR. WOLIN: Objection to form.  
 4 THE WITNESS: To the extent that it  
 5 could determine that the auction was clean.  
 6 BY MR. ISAACSON:  
 7 Q. Right. And the second-price auction  
 8 that was not clean was an auction that called  
 9 itself second-price, but really functioned at  
 10 least somewhat like a first-price auction,  
 11 correct?  
 12 MR. WOLIN: Objection to form.  
 13 THE WITNESS: That could be one of the  
 14 sources of uncleanness.  
 15 BY MR. ISAACSON:  
 16 Q. All right. And you agree that Google  
 17 developed Project Poirot again with evolving  
 18 versions?  
 19 A. Yes. We -- we see versions here of  
 20 this.  
 21 Q. And the initial version of Project  
 22 Poirot launched in July 2017, correct?  
 23 A. That sounds about right.  
 24 Q. And after that there were several  
 25 versions as Google continued to work on it.

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1 A. Yes. I do remember that.  
 2 Q. All right. And, you know, for example,  
 3 you could look at your report at Page 352 -- I  
 4 mean -- not Page 352 -- I mean, Paragraph 352 in  
 5 May 2018 Google developed a version of Poirot for  
 6 private auctions?  
 7 A. It extended the program, so it also  
 8 included the private auctions.  
 9 Q. All right. And in Paragraphs 355 in  
 10 September 2018, Google updated Project Poirot so  
 11 that you could take into account how auctions  
 12 self-identified themselves?  
 13 A. That's correct. The type of auction  
 14 format was one of the features that was  
 15 incorporated in that version, yeah.  
 16 Q. Right. Okay. And -- so and you agreed  
 17 that Project Poirot applied to exchanges that  
 18 deviated from second-pricing.  
 19 MR. WOLIN: Objection to form.  
 20 THE WITNESS: Project Poirot applied to  
 21 exchanges that were experimentally verified to be  
 22 deviated from second-pricing.  
 23 BY MR. ISAACSON:  
 24 Q. And those are the "not-clean" or "dirty  
 25 auctions"?

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1 MR. WOLIN: Objection to form.  
 2 THE WITNESS: That's how they're  
 3 characterized in these documents.  
 4 BY MR. ISAACSON:  
 5 Q. Yes. And are you aware of Google  
 6 documents that showed that advertisers increased  
 7 their surplus as a result of Project Poirot?  
 8 MR. WOLIN: Objection to form.  
 9 THE WITNESS: I believe there are some  
 10 experiments that show the increase in advertiser  
 11 surplus.  
 12 BY MR. ISAACSON:  
 13 Q. Right. And are you aware that there are  
 14 Google documents that show that Poirot increased  
 15 advertiser conversions per dollar on exchanges?  
 16 MR. WOLIN: Objection to form.  
 17 THE WITNESS: I believe there could be  
 18 documents like that.  
 19 BY MR. ISAACSON:  
 20 Q. Are you aware of any documents that  
 21 would dispute that Poirot benefited advertisers  
 22 by increasing their conversions and increases  
 23 their conversions per -- per dollar?  
 24 MR. WOLIN: Objection to form.  
 25 THE WITNESS: In general, Poirot

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1 documents and experiments show a -- an increase  
 2 in surplus for some of the advertisers.  
 3 BY MR. ISAACSON:  
 4 Q. And you agreed that by increasing  
 5 surplus Poirot was benefiting advertisers?  
 6 MR. WOLIN: Objection to form.  
 7 THE WITNESS: Generally speaking, these  
 8 bid shading programs are aimed at increasing the  
 9 surplus of these advertisers, and that's borne  
 10 out in some of the experiments.  
 11 BY MR. ISAACSON:  
 12 Q. Right. And because the -- Poirot was  
 13 aimed at these auctions that were not clean, or  
 14 "dirty," would you agree that Project Poirot was  
 15 also aimed at improving the ecosystem as a whole.  
 16 MR. WOLIN: Objection to form.  
 17 BY MR. ISAACSON:  
 18 Q. The ad tech ecosystem?  
 19 MR. WOLIN: Same objection.  
 20 THE WITNESS: Bid shading programs  
 21 like Poirot are -- are needed when facing  
 22 auctions that don't run second-price auctions.  
 23 So in that sense, programs like Poirot are  
 24 necessary to develop strategies for such  
 25 auctions.

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1 BY MR. ISAACSON:  
 2 Q. All right. And bid shading programs  
 3 like Poirot are needed -- when facing auctions  
 4 that don't run second-price auctions, they're  
 5 needed about the ecosystem -- for the healthy  
 6 ad tech ecosystem, correct?  
 7 MR. WOLIN: Objection to form.  
 8 THE WITNESS: They're mainly needed by  
 9 the bidders into this auction -- these unclean  
 10 auctions.  
 11 BY MR. ISAACSON:  
 12 Q. Right. The risk is that the bidders  
 13 are going to bid not knowing the truth about the  
 14 exchange they're bidding into, right?  
 15 MR. WOLIN: Objection to form.  
 16 THE WITNESS: They could determine, like  
 17 the experiments that were used to apply Poirot  
 18 to, the nature of the auctions that they were  
 19 bidding in.  
 20 BY MR. ISAACSON:  
 21 Q. Right. But if bidders have to run  
 22 experiments themselves to determine whether an  
 23 auction is clean, that's not good for a healthy  
 24 ad tech ecosystem, is it?  
 25 MR. WOLIN: Objection to form.

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1 THE WITNESS: In general, it would be  
 2 better to know the auction format that you're  
 3 bidding into. That would save a -- a lot of  
 4 trouble.  
 5 BY MR. ISAACSON:  
 6 Q. All right. Now, you say that Google's  
 7 initial purchase with Poirot were overly-simple  
 8 and did not reduce bids optimally, right?  
 9 A. Yes, I remember.  
 10 Q. And when you say "the initial approaches  
 11 with Poirot did not reduce bids optimally," what  
 12 do you mean by "optimally"?  
 13 A. So in the context of Poirot, when we  
 14 look at an impression that's coming up for sale  
 15 in one of these not-clean, second-price auctions,  
 16 how should we determine how much we should shade  
 17 the bid by? That -- that is the question that  
 18 Poirot and other bid shading programs address.  
 19 Typically, the amount of shading you  
 20 would perform depends on the competition. If  
 21 there's vigorous competition, you would shade  
 22 less. If there's weak competition, you would  
 23 shade more.  
 24 The competition for an impression is a  
 25 feature of where it arises from and which

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1 THE WITNESS: Multi-calling was a  
 2 strategy that we discussed that Google identified  
 3 some publishers as adopting for the sake of  
 4 finding the best price for its impression.  
 5 BY MR. ISAACSON:  
 6 Q. And there -- there -- there are probably  
 7 other ways -- well, depends what you call it, but  
 8 there's probably multiple ways to price-fish. Is  
 9 that --  
 10 MR. WOLIN: Objection to form.  
 11 THE WITNESS: Broadly speaking, I would  
 12 say "price fishing" means -- could mean different  
 13 things to different people.  
 14 BY MR. ISAACSON:  
 15 Q. All right. And have you expressed any  
 16 opinions in your report about whether unified  
 17 -- Google's unified pricing rules had an impact  
 18 in reducing "price fishing"?  
 19 MR. WOLIN: Objection to form.  
 20 THE WITNESS: Most of the discussions  
 21 I've seen around unified pricing rules do not  
 22 talk about "price fishing." They talk about the  
 23 disadvantages that AdX floors face.  
 24 BY MR. ISAACSON:  
 25 Q. Okay. The -- have you seen -- in

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1 connection with "price fishing", have you also  
 2 seen the concept of self-competition, that  
 3 an advertiser, when it's asked to bid on an  
 4 impression from multiple sources, might  
 5 accidentally compete against its own bid?  
 6 MR. WOLIN: Objection to form.  
 7 THE WITNESS: Yes. I've -- I've seen  
 8 that phenomenon. It's sometimes called  
 9 second-pricing yourself.  
 10 BY MR. ISAACSON:  
 11 Q. Yeah. And that's also not healthy  
 12 for the ad tech ecosystem if advertisers  
 13 inadvertently start competing against their own  
 14 bids.  
 15 MR. WOLIN: Objection to form.  
 16 THE WITNESS: It's a part of the  
 17 fragmentation of the market that we were talking  
 18 about earlier.  
 19 BY MR. ISAACSON:  
 20 Q. Do other ad tech tools or companies have  
 21 similar rules to the unified pricing rules of  
 22 Google?  
 23 MR. WOLIN: Objection to form.  
 24 THE WITNESS: I have not examined that  
 25 in detail.

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1 MR. ISAACSON: Okay. Let's see.  
 2 12-2-23.  
 3 This will be 8? 9?  
 4 THE REPORTER: Correct.  
 5 MR. ISAACSON: You would know.  
 6 MR. WOLIN: Nine now.  
 7 THE REPORTER: Nine.  
 8 THE WITNESS: Nine.  
 9 (Ravi Exhibit No. 9, a printout of an  
 10 article from "Audience Network," Facebook.com/  
 11 audiencenetwork/partner-program/code-of-conduct,  
 12 was introduced.)  
 13 BY MR. ISAACSON:  
 14 Q. All right.  
 15 All right. Exhibit 9 from  
 16 Facebook.com's Code of Conduct -- I believe  
 17 that's now Meta's Code of Conduct. And have you  
 18 -- and for their auctions. Have you seen -- have  
 19 you reviewed Facebook -- materials about Facebook  
 20 auctions before?  
 21 MR. WOLIN: Objection to form.  
 22 THE WITNESS: No. Not in any detail.  
 23 BY MR. ISAACSON:  
 24 Q. Okay. And it says at the bottom of  
 25 Page 2, "Reserve price mechanisms should not be

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1 updated dynamically at" -- oh, no, I'm wrong  
 2 -- no, I'm right about that. "When a reserve  
 3 price is applied as part of the auction, it  
 4 should apply identically to all demand sources."  
 5 Does it surprise you that Meta would  
 6 have that in their Code of Conduct for auctions?  
 7 MR. WOLIN: Objection to form.  
 8 THE WITNESS: Yeah. I haven't thought  
 9 deeply about it to cause surprise.  
 10 BY MR. ISAACSON:  
 11 Q. All right. The -- do you know whether  
 12 Google's competitors consider unified pricing  
 13 rules to be a best practice for publishers?  
 14 MR. WOLIN: Objection to form.  
 15 THE WITNESS: Again, I've not examined  
 16 that deeply, no.  
 17 (Ravi Exhibit No. 10, an article from  
 18 Xandr.com titled "Seller Best Practices," was  
 19 introduced.)  
 20 MR. ISAACSON: This will be Exhibit 10.  
 21 THE REPORTER: Here you go, sir.  
 22 MR. WOLIN: Thank you.  
 23 THE REPORTER: You're welcome.  
 24 BY MR. ISAACSON:  
 25 Q. All right. This is from Xandr.com,

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1 "Seller Best Practices." And if you flip to the  
 2 second page, at the bottom you'll see listed as a  
 3 best practice "to Ensure price floor parity  
 4 across your tech staff." And it says in the  
 5 last column, "Establishing consistent price  
 6 floors minimizes bidder errors and improves  
 7 bidder decision" -- "decisioning by eliminating  
 8 ambiguity."  
 9 All right. Does that surprise you to  
 10 see that Microsoft's Xandr company lists that as  
 11 a -- uniform price floors as a best practice?  
 12 MR. WOLIN: Objection to form.  
 13 THE WITNESS: Again, I've not thought  
 14 deeply enough to form a impression of surprise or  
 15 otherwise.  
 16 BY MR. ISAACSON:  
 17 Q. Right. When you say you haven't thought  
 18 deeply about it, are you saying that while you're  
 19 critical of Google implementing uniform pricing  
 20 rules, that you have no knowledge of whether its  
 21 competitors consider that to be a best practice  
 22 in the industry?  
 23 MR. WOLIN: Objection to form.  
 24 THE WITNESS: My opinions about uniform  
 25 pricing rules of Google come from examining the

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1 context in which they were deployed, which is  
 2 what I describe in the report.  
 3 I would need to develop sufficient  
 4 context to understand whether these rules were  
 5 appropriate or not and whether I should be  
 6 surprised or not.  
 7 BY MR. ISAACSON:  
 8 Q. Right. You have not done the work to  
 9 date to understand whether these rules were  
 10 appropriate or not; is that correct?  
 11 MR. WOLIN: Objection to form.  
 12 BY MR. ISAACSON:  
 13 Q. Referring to the unified -- unified  
 14 pricing rules?  
 15 MR. WOLIN: Same objection.  
 16 THE WITNESS: I did the work related to  
 17 Google's platform in examining the context of its  
 18 unified pricing rules.  
 19 BY MR. ISAACSON:  
 20 Q. Have you developed sufficient context to  
 21 understand whether these rules were Google --  
 22 were appropriate for Google -- well, let me put  
 23 it this way -- I'll start over.  
 24 Have you developed sufficient context by  
 25 looking at the entire industry to understand

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1 whether these rules were appropriate for Google  
 2 or any of its competitors?  
 3 MR. WOLIN: Objection to form.  
 4 BY MR. ISAACSON:  
 5 Q. Referring to the unified pricing rules.  
 6 MR. WOLIN: Same objection.  
 7 THE WITNESS: My general understanding  
 8 is that the industry supported exchange-specific  
 9 floors, which the publishers were used to. And  
 10 that's what the publishers were complaining about  
 11 when unified pricing rules were introduced by  
 12 Google.  
 13 BY MR. ISAACSON:  
 14 Q. All right. So what time period are you  
 15 talking about where the pub -- you think that the  
 16 publishers were used to having exchange-specific  
 17 floors?  
 18 A. Around the time of the introduction of  
 19 unified pricing rules. That would be around  
 20 2019.  
 21 Q. All right. And since 2019, in the last  
 22 five years, do you know whether the industry has  
 23 moved towards unified pricing rules?  
 24 MR. WOLIN: Objection to form.  
 25 THE WITNESS: While I know they have

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1 moved towards the first-price auction format, I  
 2 don't know all the details of the floors that  
 3 they enforce.  
 4 BY MR. ISAACSON:  
 5 Q. All right. The -- do you agree with  
 6 the statement in the Microsoft Xandr document  
 7 that establishing consistent price floors  
 8 minimizes bidder errors?  
 9 MR. WOLIN: Objection to form.  
 10 THE WITNESS: Thank you.  
 11 I think this is referring to what you  
 12 were talking about earlier, the potential of  
 13 bidding and -- via different intermediaries.  
 14 BY MR. ISAACSON:  
 15 Q. And do you agree with that statement,  
 16 that establishing consistent price floors  
 17 minimizes bidder error -- errors.  
 18 MR. WOLIN: Objection to form.  
 19 THE WITNESS: Broadly speaking, as you  
 20 characterized it earlier, that would be true.  
 21 BY MR. ISAACSON:  
 22 Q. And do you agree, broadly speaking, that  
 23 establishing consistent price floors improves  
 24 bidder decisioning by eliminating ambiguity?  
 25 MR. WOLIN: Objection to form.

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1 THE WITNESS: That is of the same  
 2 nature.  
 3 MR. WOLIN: Should we take a break for a  
 4 few minutes when you get to a good spot?  
 5 MR. ISAACSON: Yeah.  
 6 THE VIDEOGRAPHER: Going off the record  
 7 at 4:14.  
 8 (Recess taken.)  
 9 THE VIDEOGRAPHER: Back on the record at  
 10 4:27.  
 11 BY MR. ISAACSON:  
 12 Q. All right. If you'll look at your  
 13 report, Paragraph 216 of your opening report.  
 14 You say, "Google documents and experiment results  
 15 suggest that UPR successfully helped shift  
 16 business to AdX from rival exchanges for which  
 17 publishers had previously set lower price  
 18 floors," and then you cite two documents, I  
 19 believe.  
 20 This would be -- both are from August  
 21 2019. This would be Footnote 498 and 499, right?  
 22 A. Yes, I see that.  
 23 Q. All right. So if we look at August 15,  
 24 2019 -- this will be Exhibit --  
 25 THE REPORTER: 11.

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1 MR. WOLIN: 11.  
 2 MR. ISAACSON: 11?  
 3 THE REPORTER: Yes.  
 4 THE WITNESS: Thank you.  
 5 (Ravi Exhibit No. 11, a document  
 6 Bates Numbered GOOG-DOJ-15044036 through  
 7 GOOG-DOJ-15044043, was introduced.)  
 8 BY MR. ISAACSON:  
 9 [REDACTED]  
 10 [REDACTED]  
 11 [REDACTED]  
 12 [REDACTED]  
 13 [REDACTED]  
 14 [REDACTED]  
 15 [REDACTED]  
 16 [REDACTED]  
 17 [REDACTED]  
 18 [REDACTED]  
 19 [REDACTED]  
 20 [REDACTED]  
 21 [REDACTED]  
 22 [REDACTED]  
 23 [REDACTED]  
 24 [REDACTED]  
 25 [REDACTED]

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1 [REDACTED]  
 2 [REDACTED]  
 3 [REDACTED]  
 4 [REDACTED]  
 5 [REDACTED]  
 6 [REDACTED]  
 7 [REDACTED]  
 8 [REDACTED]  
 9 Q. Okay. And did you do anything to  
 10 evaluate the methodology behind Rubicon's  
 11 figures?  
 12 MR. WOLIN: Objection to form.  
 13 THE WITNESS: I did not do any  
 14 independent analysis of their characterization.  
 15 BY MR. ISAACSON:  
 16 Q. Okay. You did not -- you don't -- you  
 17 don't know how Rubicon got these figures, right?  
 18 A. It seems to come from an internal chart  
 19 in Rubicon.  
 20 Q. Right. But you haven't -- you haven't  
 21 seen any of the data or you don't know how they  
 22 went about creating this.  
 23 MR. WOLIN: Objection to form.  
 24 THE WITNESS: Yeah. I'm not privy to  
 25 how this chart was created.

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1 BY MR. ISAACSON:  
 2 Q. And you did not evaluate the extent to  
 3 which any effects reported here continued after  
 4 August 2019, correct?  
 5 MR. WOLIN: Objection to form.  
 6 THE WITNESS: I have not investigated  
 7 that.  
 8 BY MR. ISAACSON:  
 9 Q. And this document does not address  
 10 impact on any exchange other than Rubicon,  
 11 correct?  
 12 A. This document backed up the example I  
 13 provided in 216.  
 14 Q. And it was just one example, right?  
 15 MR. WOLIN: Objection to form.  
 16 THE WITNESS: It was an example in 216.  
 17 Yes, one example.  
 18 BY MR. ISAACSON:  
 19 Q. And did you evaluate to what extent  
 20 Rubicon's figures were impacted by the unified  
 21 first-price auction as opposed to the unified  
 22 pricing rules?  
 23 MR. WOLIN: Objection to form.  
 24 THE WITNESS: Just to be clear, you're  
 25 asking the effect of the spend of the Rubicon



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1 before, I do not analyze any single competitor  
 2 for their effects on experimentation.  
 3 MR. ISAACSON: All right. I think I've  
 4 got five minutes left. I cede it.  
 5 MR. WOLIN: If we can go off the record  
 6 and just take five minutes so I can speak with my  
 7 colleagues, and then we'll come back and see if  
 8 we have any follow-up questions.  
 9 THE VIDEOGRAPHER: All right. We are  
 10 off the record at 6:12 p.m.  
 11 (Recess taken.)  
 12 THE VIDEOGRAPHER: Back on the record at  
 13 6:16.  
 14 EXAMINATION  
 15 BY MR. WOLIN:  
 16 Q. Okay. Professor Ravi, I just have one  
 17 or two questions for you.  
 18 Could you pull out your rebuttal report,  
 19 please, and turn to Paragraph 120 on Page 68?  
 20 A. Yes, I see it. Yeah.  
 21 Q. And the final sentence in Paragraph 120  
 22 reads, "The principal places where I cite source  
 23 code are where there's ambiguity or where the  
 24 code contradicts the documents." Did I read that  
 25 correctly?


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1 A. That's what I wrote in the last  
 2 sentence.  
 3 Q. And is that a true and accurate  
 4 statement of the work that you did in this case?  
 5 A. Yes. The principal places. There might  
 6 be one or other citations that -- to corroborate  
 7 other things. But the principal places where I  
 8 cite them are to clarify ambiguity or  
 9 contradictions.  
 10 Q. And if you look at the bottom of that  
 11 page, carrying onto the next page, do you see  
 12 Paragraph 123?  
 13 A. Yes, I see it.  
 14 Q. And specifically Subparagraph B that  
 15 starts, "Second, I personally conducted and  
 16 oversaw others." Do you see that?  
 17 A. Yes. I remember that description.  
 18 Q. And Subparagraph B explains the  
 19 methodology you applied in reviewing source code;  
 20 is that correct?  
 21 A. Yes. This paragraph was in the context  
 22 of my response to Professor Rinard's claims, and  
 23 it lays out the steps that I carried out in -- in  
 24 performing my own source code analysis.  
 25 Q. And the steps that are written on this

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1 page are ones that you applied in analyzing the  
 2 conducts that you analyzed in reaching your  
 3 opinions; is that correct?  
 4 A. Yes. I first considered the programs  
 5 that were relevant to the conducts I analyzed.  
 6 And then, from that, I used that to narrow down  
 7 the portion of the snapshots of code where I  
 8 would analyze the -- the logic behind the code  
 9 itself. And then I would use the code that I  
 10 saw, and any additional questions it raised, to  
 11 surface further documents. And I would repeat  
 12 the cycle daily in my source code analysis. Yep.  
 13 MR. WOLIN: Thank you, Professor Ravi.  
 14 We have no further questions.  
 15 MR. ISAACSON: No questions.  
 16 MR. WOLIN: All right. Thank you. The  
 17 deposition has ended.  
 18 THE VIDEOGRAPHER: All right. If that  
 19 is everything, off the record on February 20th,  
 20 2024, at 6:19 p.m.  
 21 (Deposition concluded -- 6:19 p.m.)  
 22  
 23  
 24  
 25

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1 CERTIFICATE  
 2  
 3 I do hereby certify that I am a Notary  
 4 Public in good standing, that the aforesaid  
 5 testimony was taken before me, pursuant to  
 6 notice, at the time and place indicated; that  
 7 said deponent was by me duly sworn to tell the  
 8 truth, the whole truth, and nothing but the  
 9 truth; that the testimony of said deponent was  
 10 correctly recorded in machine shorthand by me and  
 11 thereafter transcribed under my supervision with  
 12 computer-aided transcription; that the deposition  
 13 is a true and correct record of the testimony  
 14 given by the witness; and that I am neither of  
 15 counsel nor kin to any party in said action, nor  
 16 interested in the outcome thereof.  
 17  
 18 WITNESS my hand and official seal this  
 19 22nd day of  
 20  
 21   
 22 Notary Public  
 23  
 24  
 25