

Exhibit 1

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In re Ripple Labs. Inc., Litigation

Jeremy W. Clark

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
OAKLAND DIVISION

In re RIPPLE LABS, INC.,)
LITIGATION)
) Case No.
) 4:18-cv-06753-PJH
This Document Relates To:)
All Actions)
)

VIDEO DEPOSITION OF JEREMY W. CLARK
OCTOBER 20, 2023
SAN DIEGO, CALIFORNIA

Reported by
Cynthia J. Vega, RMR, RDR, CSR 6640, CCRR 95

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1 The video deposition of Jeremy W. Clark, a
2 Witness herein, taken on behalf of Defendant, on
3 Friday, October 20, 2023, before Cynthia J. Vega,
4 CSR 6640, beginning at the hour of 9:06 a.m., at
5 770 First Avenue, Suite 250, in the City of
6 San Diego, County of San Diego, State of California.

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1 APPEARANCES

2

3 On behalf of the Lead Plaintiff Bradley Sostack:

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13 On behalf of the Defendant Ripple Labs, Inc.:

14 KELLOGG, HANSEN, TODD, FIGEL & FREDERICK, PLLC

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1 APPEARANCES, CON'T

2

3 On behalf of the Defendant Bradley Garlinghouse:

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10

11 The Videographer:

12 Joe Malone

13 * * * * *

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2 WITNESS

3 Jeremy W. Clark

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5 EXAMINATION

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6 By Mr. Oppenheimer

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7 By Mr. Taylor-Copeland

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8 By Mr. Oppenheimer

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10 EXHIBITS

11 EXHIBIT DESCRIPTION PAGE

12 Exhibit 159 Expert Report, Jeremy Clark, 9

13 Ph.D., P.Eng.

14 Exhibit 160 Rebuttal Report, Jeremy Clark, 14

15 Ph.D., P.Eng.

16 Exhibit 161 Article titled "Demystifying 25

17 Stablecoins"

18 Exhibit 162 Article titled "Demystifying 27

19 Stablecoins," full version

20 Exhibit 149 (Previously marked) 35

21 Exhibit 163 Expert Report of Professor 52

22 Yesha Yadav, July 18, 2023

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1 EXHIBITS, CON'T

2 EXHIBIT DESCRIPTION PAGE

3 Exhibit 164 Deposition transcript of 202

4 David Schwartz, May 26, 2021

5 Exhibit 165 Defendants' Supplemental 209

6 Responses to Lead Plaintiff's

7 Interrogatories, Set Three

8

9

10

11 QUESTIONS INSTRUCTED NOT TO ANSWER PAGE LINE

12

13 Did you come up with that heading? 206 22

14 So who came up with the term 207 21

15 "discovery responses"? Was that you

16 or the attorneys?

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1 SAN DIEGO, CALIFORNIA

2 FRIDAY, OCTOBER 20, 2023, 9:06 A.M.

3

4 THE VIDEOGRAPHER: This is file number 1 of
5 the videotaped deposition of Jeremy Clark, taken by
6 lead plaintiff in the matter of -- regarding Ripple
7 Labs, Incorporated, Litigation in the Court of
8 Northern District of California, Oakland Division.

9 This deposition is being held at Regus,
10 770 First Avenue, Suite 250, San Diego, California
11 92101.

12 Today's date is October 20, 2023. The time
13 is 9:06 Pacific Daylight Time.

14 My name is Joe Malone. I'm the
15 videographer representing Digital Evidence Group.

16 The court reporter is Cindy Vega, also in
17 association with Digital Evidence Group.

18 Will counsel please introduce yourselves
19 for the record, after which time the court reporter
20 will swear in the witness.

21 MR. TAYLOR-COPELAND: James Taylor-Copeland
22 and Max Ambrose on behalf of lead plaintiff Bradley

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1 Sostack.

2 MR. OPPENHEIMER: Bradley Oppenheimer and
3 Lilian Smith from Kellogg Hansen on behalf of
4 defendant Ripple Labs, Inc.

5 And just so the record is clear, this
6 deposition today is being taken by the defendants.

7 Can anyone on Zoom enter appearance.

8 MS. SAWANT: Yes. Prachee Sawant from
9 King & Spalding on behalf of Bradley Garlinghouse.

10

11 JEREMY W. CLARK,

12 Witness herein, being first duly sworn, testifies as
13 follows:

14

15 EXAMINATION

16 BY MR. OPPENHEIMER:

17 Q. Good morning. Could you please state your
18 name for the record.

19 A. Jeremy William Clark.

20 Q. What's your home address?

21 A. 115 Florida Drive, Beaconsfield, Quebec.

22 Q. And what's your business address?

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1 A. I don't know it off the top of my head.

2 It's something like 1515 Saint-Catherine Street

3 West, Montreal.

4 Q. And you were just sworn in by the court
5 reporter. You understand that you are testifying

6 under the same oath that you would take if you were

7 in court testifying before a judge or a jury; right?

8 A. I do.

9 Q. Is there any reason you can't give truthful
10 and accurate testimony today?

11 A. No, there isn't.

12 Q. Now, you submitted both an expert -- an
13 opening expert report and a rebuttal report in this
14 case; right?

15 A. Yes. That's correct.

16 Q. I'm going to show you a document that we'll
17 mark as Exhibit 159.

18 (Exhibit 159 marked for identification.)

19 BY MR. OPPENHEIMER:

20 Q. Mr. Clark, do you recognize Exhibit 159 as
21 a copy of your opening expert report in this case?

22 A. Yes, I do.

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1 Q. And this was submitted on June 7, 2023; is
2 that right?

3 A. That sounds right.

4 Q. And this opening report contains all of the
5 affirmative opinions you intend to offer in this
6 case; correct?

7 MR. TAYLOR-COPELAND: Objection.

8 THE WITNESS: So I do say in the report
9 itself that I reserve the right to amend the report
10 in lieu of new evidence.

11 BY MR. OPPENHEIMER:

12 Q. You haven't issued any amendments to this
13 report, have you?

14 A. I have not.

15 Q. Are there any affirmative reports -- we'll
16 come to -- I'm sorry -- affirmative opinions --
17 we'll come to rebuttal opinions in a second. But
18 are there any affirmative opinions that you intend
19 to offer in this case that are not reflected in this
20 opening report?

21 A. There are not.

22 Q. If you turn toward the back of this report,

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1 the page numbering goes up to 92 and then it
2 restarts at 1 of 30. But you see at page 92 there
3 is a heading that says "Curriculum Vitae"?

4 A. I do see that.

5 Q. Is that your CV following that heading
6 there?

7 A. That is mine.

8 Q. And the CV contains all the qualifications
9 that you considered relevant to the opinions you're
10 seeking to offer in this case; is that right?

11 A. So it certainly contains qualifications
12 that I believe are relevant. I don't know about
13 all.

14 Q. Do you have any other qualifications that
15 you believe are relevant to your expertise in this
16 case that are not disclosed in your CV?

17 A. The CV is up to date for the time of
18 submission. There could be things that were added
19 to the CV since, like papers that have been
20 published.

21 Q. I don't think that answers my question,
22 Mr. Clark.

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1 My question is: Do you have any
2 qualifications that you believe are relevant to your
3 expertise in this case that aren't disclosed in the
4 CV?

5 A. So maybe I don't understand the
6 distinction, but all I'm saying is the only thing
7 that is missing from the CV are things that I've
8 done since the report has been submitted.

9 Q. And have you done anything in the roughly
10 four months since the report has been submitted that
11 you think bears on your qualifications to offer
12 expert testimony in this case?

13 A. So I think that my expertise comes from the
14 fact that I publish in the area, so if I publish
15 additional papers in the area, that would add to my
16 expertise.

17 Q. Have you published any additional papers in
18 this area since June 7, 2023?

19 A. Indeed. Yes.

20 Q. And how many papers have you published
21 since June 7?

22 A. At least one that I can think of.

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1 Q. What is that paper?

2 A. It's called "Fast and Furious Roll-Ups" --
3 "Fast and Furious Withdrawals for Optimistic
4 Roll-Ups."

5 Q. Does that paper address XRP?

6 A. It does not.

7 Q. Does it offer a comparison between
8 different blockchain systems?

9 A. It does.

10 Q. What systems does it compare?

11 A. It compares -- so the nature of the paper
12 is not a comparison, but implicit in the research is
13 a comparison between Ethereum and Arbitrum.

14 Q. Where was that paper published?

15 A. It will appear next week at Advances in
16 Financial Technology at Princeton.

17 Q. Is that a peer-reviewed journal?

18 A. It is. It is a peer-reviewed venue. It is
19 not a journal. It is a conference.

20 Q. And that's the only additional paper you're
21 aware of --

22 A. That's the only additional paper, yes.

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1 Q. Let me finish the question.

2 A. Yes, sir.

3 Q. That's the only additional paper you're
4 aware of that you've published since the time you
5 submitted the CV attached to this expert report in
6 Exhibit 159; correct?

7 A. That's correct.

8 Q. Okay. I'm now going to show you a document
9 that we'll mark as Exhibit 160.

10 (Exhibit 160 marked for identification.)

11 BY MR. OPPENHEIMER:

12 Q. Do you recognize Exhibit 160 as a copy of
13 the rebuttal report that you submitted in this case?

14 A. I do.

15 Q. And this rebuttal report was submitted on
16 or about August 30, 2023; is that right?

17 A. That's my recollection, yes.

18 Q. Does this rebuttal report marked
19 Exhibit 160 contain all of the rebuttal opinions
20 that you intend to offer in response to the
21 defendants' experts in this case?

22 A. So I didn't include the same language that

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1 I did in the expert report, but I refer to that
2 section of the expert report. So again, I would
3 reserve the right to make any amendments to it.

4 Q. And you haven't made any amendments to this
5 report before today; correct?

6 A. Yeah, that's correct.

7 Q. Are there any opinions that you intend --
8 strike that.

9 Are there any rebuttal opinions that you
10 intend to offer in this case in response to
11 defendants' experts that are not contained in this
12 rebuttal report?

13 A. There are not.

14 Q. Now, in particular, your rebuttal report
15 addresses the opinions offered by Professor Allen
16 Ferrell and Professor Yesha Yadav; correct?

17 A. Yes, that's correct.

18 Q. You're not addressing any of the other
19 expert reports that defendants submitted; correct?

20 A. Let me see.

21 So I was given a copy of all the expert
22 reports for my consideration. And so I looked at

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1 all of them. And so it's possible that there is
2 language in here that's a reflection of having read
3 that, but it's -- the actual citations are only to
4 those two expert reports. Yeah, expert reports.

5 Q. So you read the other defendants' expert
6 reports but did not offer any rebuttal opinions in
7 response to them; correct?

8 A. They were provided to me.

9 Q. If you go to section 6 in your rebuttal
10 report, list of additional materials considered. Do
11 you see that?

12 A. I do.

13 Q. The first section lists some expert
14 reports. And let's just take them one at a time.

15 Expert report of Alan Schwartz. You're not
16 offering any rebuttal to the opinions that Professor
17 Schwartz offered in this case, are you?

18 A. Again, I considered that material. That's
19 why it is listed here. But I don't cite it directly
20 in the rebuttal.

21 Q. Right. So my question isn't whether you
22 cite it. My question is whether you were offering

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1 an opinion in response to and rebutting
2 Professor Schwartz's opinion in this case. Are you
3 offering an opinion that rebuts Professor Schwartz's
4 in this case?

5 A. I'm not.

6 Q. And same question with respect to the
7 expert report of Bradley Borden. Are you offering
8 an opinion that rebuts the opinion given by
9 Professor Borden in this case?

10 A. Same answer.

11 Q. And would it be the same with respect to
12 Professor Easton as well?

13 A. That's correct.

14 Q. Thank you.

15 Page 1 of your rebuttal report, at lines 6
16 to 7, you write, "My qualifications and other
17 background information is set forth in my previous
18 expert report."

19 That's a reference to the opening expert
20 report we saw in Exhibit 159; correct?

21 A. That's correct. It would be pages -- or
22 section 1 of that report.

1 Q. So all of the qualifications that you
2 consider relevant to your rebuttal opinions are
3 already contained in your opening report and the CV
4 that's attached to it; is that right?

5 A. So I laid out my qualifications in my
6 expert report. Is every -- is every qualification
7 in the expert report? I think we already answered
8 that question.

9 Q. Right. So putting aside the one additional
10 paper that you published since your opening report
11 was submitted, you believe the qualifications set
12 out in your opening report are all of the ones that
13 are relevant to both your opening and your rebuttal
14 opinions; correct?

15 A. So there are additional things that I've
16 added to my CV since beyond papers, but if we set
17 that aside, then yes.

18 Q. What other things have you added to your CV
19 other than papers since you submitted it in this
20 case?

21 A. So evidence of impact, invited talks and
22 seminars. So this is page 13 of 30 in the indexing

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1 of the CV.

2 Q. What have you added there?

3 A. Several talks that I've given. Do you want
4 me to enumerate them?

5 Q. If you know them all, sure.

6 A. So earlier this week I spoke at an event at
7 Concordia University called CS Net. Last week I was
8 at the University of Waterloo. I spoke at an event
9 that is the Security and Privacy Institute at the
10 University of Waterloo.

11 On Monday I spoke at an event that's the
12 Cyberjustice Institute at the University of
13 Montreal. Let's see. In the end of June, maybe
14 early July, I spoke at a16Z crypto.

15 There could be others, but those are the
16 ones that come to mind.

17 Q. No others that you remember sitting here
18 today?

19 A. That's correct. No others that I remember
20 sitting here today.

21 Q. Did any of those additional talks that you
22 just mentioned involve XRP?

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1 A. No, not directly.

2 Q. Did any of them involve the attributes of
3 currencies?

4 A. Could you define what you mean by that?
5 You mean like unit values or value?

6 Q. Right. Did any of them involve the
7 economic attributes of currencies such as unit of
8 accounts or value, et cetera?

9 MR. TAYLOR-COPELAND: Objection. Calls for
10 a legal conclusion.

11 THE WITNESS: So I certainly don't have an
12 opinion as to what qualifies as a currency or an
13 asset. And I did not cover those three topics
14 specifically in any of the talks.

15 BY MR. OPPENHEIMER:

16 Q. Did any of the talks that you just
17 mentioned involve discussing or determining the
18 location at which financial transactions occur?

19 A. No, they did not.

20 Q. Okay. Let's start with your rebuttal of
21 Professor Ferrell's opinions in Exhibit 160. And
22 that section begins at page 8; is that right?

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1 A. That looks correct.

2 Q. Now, your rebuttal opinion here is directed
3 specifically at Professor Ferrell's opinion that XRP
4 has the characteristics of a currency; is that
5 right?

6 A. More specifically the report described XRP
7 as being a unit of account. And then the evidence
8 that was offered was the fact that two websites
9 offered the ability to purchase goods or services
10 using XRP.

11 Q. Right. So you're not rebutting the other
12 opinions that Professor Ferrell offered in his
13 report; correct?

14 A. This report does not cover that.

15 Q. So, for example, Professor Ferrell
16 conducted a principal components analysis to
17 determine whether there was any -- what's called
18 alpha in the price returns of XRP. You're not
19 addressing that opinion; correct?

20 MR. TAYLOR-COPELAND: Objection.

21 THE WITNESS: Yeah, that's right. That's
22 not addressed at all.

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1 BY MR. OPPENHEIMER:

2 Q. Okay. And so just to be clear, the only
3 opinion from Professor Ferrell's report that you're
4 addressing is whether XRP qualifies as a unit of
5 account; is that right?

6 A. Yes, that's correct.

7 Q. Okay. You're not an economist, are you?

8 A. No, I'm not.

9 Q. You don't have any degree in finance or
10 economics, do you?

11 A. I do not have a degree in finance or
12 economics.

13 Q. What special training, if any, do you have
14 on how to evaluate what is or is not a unit of
15 account?

16 A. So I've taken courses in the area of
17 finance. I've read lots of research literature in
18 that area. I've done research collaborations with
19 economists. And so whatever I know about that field
20 was through my research activities and my academics.

21 Q. The courses that you just mentioned, are
22 those undergraduate or graduate courses?

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1 A. Graduate.

2 Q. What courses did you take in the area of
3 finance?

4 A. Financial -- financial engineering, I
5 believe it was called.

6 Q. And did that course provide any instruction
7 on how to determine what is or is not a unit of
8 account?

9 A. I don't recall sitting here today.

10 Q. Okay. Have you ever published any papers
11 that address how to determine what is or is not a
12 unit of account?

13 A. So I don't recall exactly, but I suspect I
14 have.

15 Q. Sitting here today you can't name a paper
16 that you published that addresses that issue, can
17 you?

18 A. So I could name a paper that I suspect has
19 that in it, but I would have to review the paper to
20 make sure that it is in.

21 Q. And what paper is that?

22 A. So if you turn to my CV, I'll point it out.

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1 Okay. So on page 9 of 30, this is a
2 topic -- I'll just tell you a few places in my CV
3 that this could appear. So there is a possibility
4 that it is discussed in J09, the ninth journal,
5 which is "Systemizing the Challenges of Auditing
6 Blockchain-Based Assets."

7 The next paper is called "Demystifying
8 Stablecoins." That's another place that it could
9 be.

10 And then if you flip to -- well, first off
11 if you flip to my invited talks, a lot of them I'll
12 deal with that particular issue. So just maybe to
13 pick one. There is a lot of talks that I've given,
14 for example, on page 14, to BMO, Bank of Montreal.
15 It's called "Blockchain Technologies: Landscape and
16 Future Directions."

17 So this is a standard talk that I give a
18 lot. The slides vary, but the properties of money
19 is something that I have had slides about. So I
20 don't recall exactly if that -- at that particular
21 event I covered it, but it is something.

22 And then if you flip to page 23 of 30,

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1 you'll notice that I teach a course. It's called
2 "Blockchain Technology." And so one of the lectures
3 that I give covers this as well.

4 Q. Okay. So let's start with the talk that
5 you just mentioned, BMO, Bank of Montreal. Do you
6 have any notes or slides available from that talk
7 that you've hosted on your website or elsewhere?

8 A. Yes. I believe they're on my website.

9 Q. And working backward from that, you
10 mentioned the article demystifying stablecoins as
11 one place where you may have addressed those; is
12 that right?

13 A. That's right.

14 MR. OPPENHEIMER: I happen to have a copy
15 of that article, so let's mark that as Exhibit 161.

16 (Exhibit 161 marked for identification.)

17 BY MR. OPPENHEIMER:

18 Q. Mr. Clark, do you recognize Exhibit 161 as
19 the demystifying stablecoins article you were just
20 describing?

21 A. Yes and no. So this is the magazine
22 version of the article, which is the abbreviated

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1 version. So there is a much -- like longer tech
2 report that's cited in the article itself. So on
3 page 46, citation 3 is the full version of it. And
4 so this is the kind of thing that would have ended
5 up in the appendix because it wasn't -- it was sort
6 of an indirect thing.

7 Q. Okay.

8 A. So this does not include the appendix.

9 Q. Exhibit 161 was the version that was
10 published in the communications of the ACM magazine;
11 right?

12 A. That's correct.

13 Q. And feel free to take a look at it, but it
14 sounds like you just said from your last answer that
15 this material that was published in communications
16 of the ACM does not have a discussion of unit of
17 account; is that right?

18 MR. TAYLOR-COPELAND: Objection.

19 Take your time to read it.

20 THE WITNESS: So based on my brief review
21 of the paper, I would say that that's correct.

22 MR. OPPENHEIMER: Okay. I'm going to show

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1 you another document we'll mark as Exhibit 161.

2 (Exhibit 162 marked for identification.)

3 MS. SMITH: Yeah. I think this was 161.

4 MR. OPPENHEIMER: I'm sorry. 162. Thank
5 you.

6 (Exhibit 162 marked for identification.)

7 BY MR. OPPENHEIMER:

8 Q. Is Exhibit 162 the full version of the
9 demystifying stablecoins article that you were just
10 describing?

11 A. Yes. I recognize it as being such.

12 Q. Okay. And if you look at page -- the
13 bottom of page 12, you see the section headed A.5,
14 functions of money?

15 A. I see it.

16 Q. Is that the portion of the appendix that
17 you're referring to earlier that you believe
18 discusses whether something is a unit of account?

19 A. So earlier when I referred to it, I just
20 thought that this might have been a topic that was
21 discussed in this paper. I certainly didn't have a
22 particular section of the paper in mind.

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1 Q. Okay. Is this the section of the paper
2 that discusses that topic?

3 A. This appears to be a section of the paper
4 that discusses -- that does discuss the topic.

5 Q. Okay. Feel free to read through the
6 remainder. My question to you is: There is no
7 other section that discusses whether something is a
8 unit of account, is there?

9 MR. TAYLOR-COPELAND: Objection.

10 THE WITNESS: So I believe it's the only
11 direct mention of that property. However, that
12 property might inform other things that are said in
13 the paper.

14 BY MR. OPPENHEIMER:

15 Q. Okay. But this is the only direct mention
16 of unit of account; is that right?

17 A. Yes. So this is -- for the record, it is a
18 30-page paper and I looked at it for about five
19 minutes. So to the extent that I looked at it,
20 that's true.

21 Q. It's a 30-page paper that you published?

22 A. That's correct.

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1 Q. Okay. Now, in this section A.5 that we
2 were just talking about, there is no citations to
3 any sources for the definition of unit of account;
4 right?

5 A. Can I go back to your previous question?

6 Q. Sure. Well, let me ask you this. Answer
7 the question I just asked and then we can go back.
8 I'm happy to let you go back, but I want to make
9 sure we don't miss this one.

10 A. Okay.

11 Q. I will ask it again. In this section A.5
12 that we were just talking about, there is no
13 citation to any sources for the definition of unit
14 of account; right?

15 A. That is correct.

16 Q. Okay. You had something to add to that?

17 A. Yes. So your previous question was but I
18 published this paper. I just wanted to note that
19 this was a co-authored paper. So I was a co-author
20 on this paper.

21 Q. Got it. You can set that aside. I'll turn
22 back to your rebuttal report in Exhibit 160.

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1 Mr. Clark, how do you define "unit of
2 account"?

3 A. So in the rebuttal report I didn't include
4 his definition of unit of account, but I accepted
5 his definition. So I wasn't seeking out to define
6 it for myself.

7 Q. Are you aware of any definitions of unit of
8 account that you believe to be prevailing in
9 financial literature?

10 A. There is a very influential textbook. I
11 believe Greg Mankiw was the author of it. It is a
12 standard undergraduate textbook in economics. It
13 may have even been the first to sort of define those
14 properties of money, but that's a standard
15 definition that's used.

16 Q. And do you know what definition the Mankiw
17 textbook uses?

18 A. So I couldn't recite that definition
19 sitting here today.

20 Q. Okay. Did you consult the Mankiw textbook
21 when you were working on this opinion?

22 MR. TAYLOR-COPELAND: Objection.

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1 THE WITNESS: No, I don't think I did.

2 BY MR. OPPENHEIMER:

3 Q. Now, you write at page 8, lines 14 through
4 15, "A currency that is used to denote the value of
5 assets and liabilities is said to fulfill this
6 property."

7 Is it your opinion that a currency that is
8 used to say how much an asset or a liability is
9 worth is a unit of account?

10 MR. TAYLOR-COPELAND: Objection.

11 THE WITNESS: Let me reread it and then I'm
12 going to have you ask your question again.

13 Okay. Can you ask your question again?

14 BY MR. OPPENHEIMER:

15 Q. Is it your opinion that a currency that is
16 used to say how much assets or liabilities are worth
17 is a unit of account?

18 A. Can you -- what do you mean to say, like
19 someone says it?

20 Like if I say something like I'll accept
21 three cows for that, that doesn't make it a unit of
22 account.

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1 Q. Well, let me ask it this way. I'm just
2 trying to understand what you wrote here in lines 14
3 through 15. "A currency that is used to denote the
4 value of assets and liabilities is said to fulfill
5 this property."

6 That's what you wrote in your report;
7 right?

8 A. That's correct.

9 Q. So my question is: Is it your opinion that
10 if a currency is used when quoting how much assets
11 and liabilities are worth, is that what makes it a
12 unit of account?

13 MR. TAYLOR-COPELAND: Objection.

14 THE WITNESS: So the unit of account --
15 okay. So assets and liabilities would be described
16 on a balance sheet. These are often audited
17 financial statements. And there is rules about what
18 you can use to denote things. And so those would be
19 called a unit of account, for example.

20 BY MR. OPPENHEIMER:

21 Q. So is it your opinion that a currency can
22 only be a unit of account if it's used on audited

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1 financial statements?

2 MR. TAYLOR-COPELAND: Objection.

3 THE WITNESS: So I wouldn't say "only." My
4 opinion is that for the purposes of that financial
5 system, that currency is the unit of account.

6 BY MR. OPPENHEIMER:

7 Q. So currencies don't have to be used on
8 audited financial statements in order to be units of
9 account?

10 MR. TAYLOR-COPELAND: Objection.

11 THE WITNESS: It's possible.

12 BY MR. OPPENHEIMER:

13 Q. What methodology did you use to
14 determine -- strike that.

15 What methodology can anyone use to
16 determine whether a currency is a unit of account?

17 A. So -- okay. So I can't recite a
18 methodology sitting here today.

19 Q. And what methodology did you use to
20 determine whether XRP was a unit of account?

21 A. I did not determine that XRP was a unit of
22 account. That was not my opinion.

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1 Q. I asked you -- you didn't reach a
2 conclusion one way or the other; is that right?

3 A. No. I reached a conclusion that the
4 evidence that was provided did not show that XRP was
5 a unit of account.

6 Q. Okay. So you're not offering an opinion
7 that XRP is not a unit of account; is that right?

8 MR. TAYLOR-COPELAND: Objection. Misstates
9 testimony.

10 THE WITNESS: So my opinion is just what
11 the report says, which is that the two examples that
12 were provided in this report do not demonstrate that
13 XRP is a unit of account.

14 BY MR. OPPENHEIMER:

15 Q. Okay.

16 A. And I am not offering an opinion beyond
17 that.

18 Q. Okay. So you're not opining that XRP could
19 not be a unit of account in other contexts?

20 A. That's correct.

21 Q. And you're not offering an opinion that XRP
22 has never been a historical -- scratch that.

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1 You're not offering an opinion that XRP has
2 never historically been used as a unit of account
3 somewhere?

4 MR. TAYLOR-COPELAND: Objection.

5 THE WITNESS: Yeah. That's correct.

6 MR. OPPENHEIMER: Let's take a look at
7 Professor Ferrell's report, which was previously
8 marked as Exhibit 149.

9 (Exhibit 149 was previously marked.)

10 BY MR. OPPENHEIMER:

11 Q. I'm going to direct you to page 34,
12 paragraph 65. You see in the first sentence there
13 Professor Ferrell says that XRP can be used, quote,
14 "to express prices at cryptocurrency exchanges"?

15 Do you see that?

16 A. I don't. Sorry.

17 MR. TAYLOR-COPELAND: Objection. Misstates
18 the document.

19 THE WITNESS: Can you clarify where I'm
20 looking?

21 BY MR. OPPENHEIMER:

22 Q. The first sentence of paragraph 65, at the

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1 end of that sentence.

2 MR. TAYLOR-COPELAND: Just for the record,
3 the whole sentence says, "XRP can be used as a
4 common base to express the price of a unit of XRP on
5 the XRP Ledger, but also to express prices at
6 cryptocurrency exchanges."

7 THE WITNESS: So I see the sentence that
8 was just read.

9 BY MR. OPPENHEIMER:

10 Q. Okay. In your rebuttal report, you don't
11 address whether XRP can be used to express prices on
12 the XRP Ledger, do you?

13 A. So I don't address that in the rebuttal
14 report.

15 Q. Okay. And you also don't address in your
16 rebuttal report whether it can be used to express
17 prices at cryptocurrency exchanges; right?

18 A. So I believe that's addressed indirectly.

19 Q. Where can I find that indirectly in your
20 rebuttal report?

21 A. So if you go to page 8, line 20, the end of
22 the sentence says, "website determining the price of

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1 XRP in US dollars and offering a quote in XRP."

2 So that's not a direct -- I'm not directly
3 responding to the sentence that you talked about,
4 but it does indicate that prices are quoted on
5 exchanges in XRP.

6 Q. Do you know which fiat currencies and
7 cryptocurrencies are priced in XRP on exchanges?

8 MR. TAYLOR-COPELAND: Objection.

9 THE WITNESS: So I think that's a hard
10 question to answer directly. It sort of goes into
11 the mechanisms of how exchanges work.

12 BY MR. OPPENHEIMER:

13 Q. Are you aware that there are exchanges that
14 allow trading between Bitcoin and XRP?

15 MR. TAYLOR-COPELAND: Objection.

16 THE WITNESS: So I'm aware that there are
17 exchanges where, if you have Bitcoin, you can do a
18 trade and it results in you having XRP. It's not
19 quite exactly what you asked, but...

20 BY MR. OPPENHEIMER:

21 Q. Are you offering an opinion that when
22 trading Bitcoin that someone owns in order to get

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1 XRP or vice versa on an exchange that those prices
2 are actually -- that the quoted prices are actually
3 run through US dollars as an intermediary?

4 MR. TAYLOR-COPELAND: Objection.

5 THE WITNESS: Sorry. You need to repeat
6 the question.

7 BY MR. OPPENHEIMER:

8 Q. Are you offering opinion that when people
9 trade Bitcoin for XRP on exchanges that the price
10 quotes for Bitcoin to XRP are actually run through
11 US dollars as an intermediary?

12 MR. TAYLOR-COPELAND: Objection.

13 THE WITNESS: Is your question that that
14 might happen or it always happens?

15 BY MR. OPPENHEIMER:

16 Q. My question is: Are you offering an
17 opinion that that happens?

18 MR. TAYLOR-COPELAND: Objection.

19 THE WITNESS: That it always happens or
20 that it could happen?

21 BY MR. OPPENHEIMER:

22 Q. Let's start with it always happens.

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1 A. No, I'm not offering that opinion.

2 Q. Okay. And in your rebuttal report you
3 didn't undertake any investigation of whether or how
4 often that happens on digital asset exchanges, did
5 you?

6 A. That's correct. So I have background
7 knowledge of exchanges, but for the purposes of the
8 expert report I didn't go out and conduct any
9 experiments --

10 Q. Okay.

11 A. -- along those lines.

12 Q. Now, is it your opinion that if a seller is
13 willing to accept XRP as payment for goods or
14 services, that is still not a unit of account
15 unless -- well, let me ask it this way. Strike
16 that.

17 Is it your opinion that if a seller is
18 willing to accept XRP as payment for goods or
19 services, but the seller is ultimately going to
20 convert it into US dollars, that that's not a unit
21 of account?

22 MR. TAYLOR-COPELAND: Objection.

1 THE WITNESS: So that is not the opinion
2 that I'm offering in this report.

3 BY MR. OPPENHEIMER:

4 Q. Are you offering an opinion that if a quote
5 is made in US dollars and then converted to XRP that
6 XRP is not a unit of account?

7 MR. TAYLOR-COPELAND: Objection.

8 THE WITNESS: Can you repeat the question?

9 BY MR. OPPENHEIMER:

10 Q. Are you offering an opinion that if a quote
11 for a price is made in US dollars and then converted
12 to XRP, that XRP is not a unit of account?

13 MR. TAYLOR-COPELAND: Objection.

14 THE WITNESS: So my opinion is that XRP is
15 not being used as the unit of account for that
16 particular action. It doesn't say that anything
17 about XRP more broadly than that.

18 BY MR. OPPENHEIMER:

19 Q. And you don't cite any sources in your
20 rebuttal report to say that when XRP is used in that
21 way, or when any currency is used in that way, that
22 it is not a unit of account --

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1 MR. TAYLOR-COPELAND: Objection.

2 ///

3 BY MR. OPPENHEIMER:

4 Q. -- is that right?

5 A. So if your question is do I make any
6 citations, the answer is no.

7 Q. Okay. One of the things you note in your
8 rebuttal opinion at line 22 of page 8 is that one of
9 the websites Professor Ferrell quoted -- or
10 Professor Ferrell cited warns that you will only
11 have 20 minutes to make the transaction; is that
12 right?

13 A. Yes. That's correct. That's a direct
14 quote from the website.

15 Q. Do you think that the presence of a
16 countdown timer on a travel sites price quote means
17 that the quoted currency isn't a unit of account?

18 A. I don't believe that's a necessary
19 condition for the currency to be not considered a
20 unit of account.

21 Q. There was a lot of negatives in there, so
22 let me see if I can untangle that with you.

1 A. Yeah. So I think your question is, is it a
2 necessary condition that there must be a countdown
3 timer in order to conclude this, and the answer is
4 no. You could conclude this without there being a
5 countdown timer.

6 Q. Right. So my question is actually, if you
7 want to use necessary or sufficiency as the terms,
8 is your opinion that the presence of a countdown
9 timer is sufficient to disqualify something as a
10 unit of account?

11 MR. TAYLOR-COPELAND: Objection.

12 THE WITNESS: No, of course not.

13 BY MR. OPPENHEIMER:

14 Q. Okay. So how is the countdown timer
15 relevant to your opinion?

16 A. So there is a function for the countdown
17 timer, and it coheres with the story which is that
18 this website is thinking of the web service, I
19 guess, the domain name in US dollar terms. And so
20 based on my experience in the area and people that
21 I've talked to, the reason that this functionality
22 is added to websites is because there is a fear that

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1 the exchange rate is going to change and so the
2 quote will go stale. And that presents an arbitrage
3 opportunity, even if you have no interest in the
4 domain name itself.

5 Q. Do you agree that other currencies such as
6 US dollars can also change exchange rates over time?

7 A. Exchange rates with -- exchange implies
8 there is two assets. So you mean like the US dollar
9 to Canadian dollar exchange rate changes?

10 Q. Sure. Let's take that example. The
11 exchange rate of US dollars to Canadian dollars can
12 also change; right?

13 A. Can I just rephrase your question? You're
14 asking does the exchange rate between US dollars and
15 Canadian dollars change over time?

16 Q. Yes.

17 A. Yes, it does. That's my understanding,
18 yes.

19 Q. That doesn't disqualify US dollars or
20 Canadian dollars from being a unit of account, does
21 it?

22 A. The fact that it is exchange rate with --

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1 the Canadian dollars changes over time does not
2 disqualify it for being a unit of account.

3 Q. So why is it different for XRP?

4 MR. TAYLOR-COPELAND: Objection.

5 THE WITNESS: So my opinion isn't about
6 XRP. My opinion is about this website and whether
7 it is using XRP as a unit of account.

8 BY MR. OPPENHEIMER:

9 Q. Okay. You -- on page 10 of your rebuttal
10 report, you describe some website rankings for the
11 websites at issue. Is there a minimum level of
12 popularity that you think a website has to have in
13 order to qualify the currency it uses as a unit of
14 account?

15 A. Sorry. Can you -- I'll let you drink and
16 then maybe you can repeat the question.

17 Q. Is there a minimum level of popularity you
18 think a website has to have in order to qualify the
19 currency it uses as a unit of account?

20 A. So my opinion is that these websites do not
21 use XRP as -- they do not use XRP as a unit of
22 account. So that's regardless of if they're ranked

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1 number 1 or 100,000.

2 Q. Then why is this ranking relevant to your
3 opinion, if at all?

4 A. Okay. So let me just review the report.

5 If you happen to know where it's mentioned
6 in the Ferrell report, you could save some time, but
7 I can find it as well. I just want to reread what
8 he said about these websites.

9 Q. Sure. I think earlier we were looking at
10 paragraph 65 in the Ferrell report, if that helps.

11 A. Yes. I'm not exactly there.

12 Q. Just to make the record clear, I'll ask my
13 question again. Why is the website ranking relevant
14 to your opinion, if at all?

15 A. For the record, I'm just flipping through
16 the document trying to find the reference to these
17 websites.

18 MR. TAYLOR-COPELAND: It's paragraph 65.

19 THE WITNESS: It's not, though, is it?

20 MR. TAYLOR-COPELAND: In Ferrell's report.

21 THE WITNESS: Yes. Sorry. You were right.

22 My mistake.

1 Okay. So this is just a side note that it
2 is what it says, just that these two websites are
3 very lowly ranked.

4 BY MR. OPPENHEIMER:

5 Q. In your Bitcoin and blockchain technology
6 course that you mentioned earlier, you teach -- I
7 think you mentioned you teach a lesson on whether
8 Bitcoin and other cryptocurrencies satisfy the
9 characteristics of currency; is that right?

10 A. So what I recall sitting here today is I
11 introduced those three properties of money, and I
12 probably note that it is controversial whether it
13 meets that there is no universal consensus. So I'm
14 certainly not saying that it does or does not.

15 Q. Isn't it true that you say that Bitcoin is
16 a, quote, soft fail for satisfying those three
17 properties of money in that lesson?

18 A. That sounds reasonable.

19 Q. Okay. If we can turn backward in your
20 rebuttal report to the section addressing Professor
21 Yadav's opinions. Your rebuttal report doesn't set
22 out any qualifications from your education,

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1 training, or experience relating to determining the
2 domesticity of financial transactions, does it?

3 MR. TAYLOR-COPELAND: Objection.

4 THE WITNESS: Okay. So what I say about my
5 qualifications is that it refers back to the expert
6 report. The expert report contains a CV, and the CV
7 contains references to the courses I've taught, the
8 papers I've written. And so I feel that my
9 expertise is covered by the CV itself.

10 BY MR. OPPENHEIMER:

11 Q. Okay. And what expertise do you have in
12 determining the domesticity of financial
13 transactions?

14 A. Can you define "domesticity"?

15 Q. Let's start with this. What expertise do
16 you have in determining the -- actually withdrawn.

17 Do you have an understanding of what the
18 term "domesticity" means in the context of financial
19 transactions?

20 MR. TAYLOR-COPELAND: Objection. Calls for
21 a legal conclusion.

22 THE WITNESS: I'm not here to offer legal

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1 opinions.

2 BY MR. OPPENHEIMER:

3 Q. I'm not asking for a legal opinion. I'm
4 asking whether you have an understanding -- yes or
5 no, do you have an understanding of what the term
6 domesticity means in the context of financial
7 transactions?

8 MR. TAYLOR-COPELAND: Objection.

9 THE WITNESS: I don't know exactly what you
10 mean by that term.

11 BY MR. OPPENHEIMER:

12 Q. Okay. What expertise do you have in
13 determining the physical locations where financial
14 transactions occur?

15 A. So by financial transactions, I think
16 you're referring to where the exchanges are located,
17 or are you asking something different?

18 Q. I'm not asking about exchange locations.

19 A. So I don't have a legal opinion of where
20 the transaction would be located, should it be
21 conducted on an online exchange.

22 Q. Okay. I'm asking more broadly. People all

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1 over the world engage in financial transactions.
2 They buy and sell currencies, securities,
3 commodities, other assets. What expertise do you
4 have in determining the physical location of where
5 such transactions occur?

6 MR. TAYLOR-COPELAND: Objection.

7 THE WITNESS: So what I know about how
8 financial markets operate is, you know, through --
9 for example, on my CV, I have -- you'll see that
10 I've held many grants with AMF, which is sort of the
11 Quebec version of both the SEC combined with the
12 CFTC. So these are kinds of discussions we have.
13 They have an enforcement team that looks at these
14 particular issues. I've consulted under an NDA with
15 law enforcement on these issues. So that's sort of
16 just a general background.

17 BY MR. OPPENHEIMER:

18 Q. When you say "on these issues" --

19 A. Determining the -- sorry. I should let you
20 finish your question.

21 Q. Thanks. Appreciate it.

22 When you say "on these issues," are you

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1 referring to specifically determining the location
2 of which financial transactions take place?

3 A. I'm not referring specifically to that.

4 Q. Okay. You're talking about consulting on
5 financial questions more broadly?

6 A. That would be inclusive of that question,
7 yes.

8 Q. Okay. Let me show -- actually first, just
9 to be clear, you've never published any papers on
10 determining the physical location of where
11 transactions occur; right?

12 MR. TAYLOR-COPELAND: Objection. Calls for
13 a legal conclusion.

14 THE WITNESS: So I'll say that the
15 methodologies that I've used in the rebuttal report
16 I do have papers on, but I don't have a paper that
17 spoke to exactly that question.

18 BY MR. OPPENHEIMER:

19 Q. So to be clear, you've not published a
20 paper about how to determine the physical location
21 of where a financial transaction occurs; right?

22 MR. TAYLOR-COPELAND: Objection.

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1 THE WITNESS: Yes. So it's mentioned -- I
2 mean, it is such a vague question, it is hard to
3 answer. But, for example, a cryptocurrency
4 location, if you define a location to be an IP
5 address, that would be something that's covered in
6 my research, to give you an example. So I don't
7 want to say that I've never opined on that in any of
8 my academic research.

9 I've certainly -- I've answered questions
10 that are -- or I've made statements that do have to
11 do with locations of where transactions take place.
12 But it's not a research focus, which is maybe what
13 you're getting at.

14 BY MR. OPPENHEIMER:

15 Q. My question is a little different.

16 You've never published a paper about how to
17 figure out that location, have you?

18 MR. TAYLOR-COPELAND: Objection.

19 THE WITNESS: Yes. So I believe that
20 that -- so I can say for certain that I haven't
21 published a paper where that's the main contribution
22 of the paper, but I do believe that throughout my

1 academic papers there has been a lot of discussion
2 of de-anonymizing transactions.

3 So as you know, things like Bitcoin have a
4 veil of anonymity and the de-anonymization of
5 transactions is a research topic that I'm very
6 familiar with and it is something that I've
7 addressed in my papers to the extent -- so the paper
8 that jumps up to mind is I have a paper called
9 "Mixcoin," and so that's one paper that perhaps
10 would discuss it, but I don't recall exactly sitting
11 here today what it says.

12 MR. OPPENHEIMER: Okay. So let's take a
13 look at a document I'm going to mark as Exhibit 163.
14 It is a copy of Professor Yadav's expert report.

15 (Exhibit 163 marked for identification.)

16 BY MR. OPPENHEIMER:

17 Q. Okay. If I can direct you to page 43 of
18 Exhibit 163. You'll see at the very top of the page
19 there is a heading Roman numeral V, it starts with
20 "Opinion:" Do you see that?

21 A. I see it. Yes.

22 Q. Okay. So this first opinion in Professor

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1 Yadav's report says, "Opinion: Offers to buy and
2 sell currency" -- I'm sorry. Let's start again.

3 This first opinion says, "Opinion: Offers
4 to buy and sell cryptocurrencies on an exchange are
5 made on the exchange. Once offers to buy and sell
6 are matched, they become final and binding trades on
7 the exchange."

8 You're not disagreeing with that opinion,
9 are you?

10 MR. TAYLOR-COPELAND: Objection.

11 THE WITNESS: Are you asking whether I
12 agree with it or whether the report rebuts that?

13 ///

14 BY MR. OPPENHEIMER:

15 Q. I'm asking whether your rebuttal report
16 offers a rebuttal to that opinion.

17 A. It does not.

18 Q. Okay. Take a look at page 49, the next
19 Roman numeral heading VI. This one says, "Opinion:
20 Trades of cryptocurrencies on exchanges become final
21 when orders are matched by an exchange pursuant to
22 exchange rules, not when any transactions are

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1 reflected on the blockchain (which may never
2 occur)."

3 A. Sorry. I lost the page number.

4 Q. Page 49.

5 A. 49. Sorry. Okay.

6 Q. So page 49, the opinion here -- I'll read
7 it again now that you're on the same page.

8 "Opinion: Trades of cryptocurrencies on
9 exchanges become final when orders are matched by an
10 exchange pursuant to exchange rules, not when any
11 transactions are reflected on the blockchain (which
12 may never occur)."

13 Your rebuttal report isn't offering an
14 opinion in response to that opinion from
15 Professor Yadav, is it?

16 A. So I believe there is references in this
17 section that overlap with things that I do discuss
18 in my report. So, for example, I might direct you
19 to line 105 on page 55. So she writes that
20 "blockchains may have fragilities in the form of
21 malicious attacks or outages," which I believe I
22 discuss in my expert report.

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1 Q. I don't think that's quite my question. So
2 maybe I can sharpen it.

3 A. Sure.

4 Q. Professor Yadav is offering an opinion that
5 says, "Trades of cryptocurrencies on exchanges
6 become final when orders are matched by an exchange
7 pursuant to exchange rules, not when any
8 transactions are reflected on the blockchain (which
9 may never occur)."

10 Your rebuttal report doesn't disagree with
11 that conclusion, does it?

12 MR. TAYLOR-COPELAND: Objection.

13 THE WITNESS: So the professor will have a
14 basis for that opinion, and it's quite possible that
15 my expert rebuttal addresses the basis of her
16 opinion. It seems -- I mean, I'm just glancing at
17 this now, but if she's bringing up this idea of
18 attacks as the basis. Otherwise, I don't know why
19 it would be in that section if it is not a basis for
20 that opinion, then I might not agree with the entire
21 basis of what she's saying.

22 BY MR. OPPENHEIMER:

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1 Q. Where in your opinion in your rebuttal
2 report do you offer an opinion that trades of
3 cryptocurrencies on exchanges do not become final
4 when orders are matched by an exchange pursuant to
5 exchange rules?

6 A. So that's not an opinion that's contained
7 in my report.

8 Q. Okay.

9 MR. TAYLOR-COPELAND: Now a good time for
10 us to take a break? We've been going for about an
11 hour.

12 MR. OPPENHEIMER: Sure. Let's go off the
13 record.

14 THE VIDEOGRAPHER: Off the record,
15 10:07 a.m.

16 (Recess, 10:08 a.m. to 10:19 a.m.)

17 THE VIDEOGRAPHER: This begins media file
18 number 2, today's testimony of Jeremy Clark. We're
19 back on the record at 10:19 a.m.

20 BY MR. OPPENHEIMER:

21 Q. If we can continue in Professor Yadav's
22 report, Exhibit 163. I'm going to direct you to

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1 page 56.

2 At the very bottom there is a heading that
3 says, "Opinion: For 20 of 25 of the exchanges
4 listed in table A, there is no indication that the
5 exchanges are located within the United States."

6 Your rebuttal report doesn't offer any
7 opinion that any of those 20 exchanges are, in fact,
8 located within the United States, does it?

9 MR. TAYLOR-COPELAND: Objection.

10 THE WITNESS: So in the rebuttal report I
11 was provided with a set of exchanges and asked
12 whether they were located in the United States. So
13 the ones that I list -- Coinbase, Kraken, Poloniex,
14 Bittrex -- are the ones that I analyze.
15 Finance.US -- like do you want me to go through the
16 list and see whether those things match?

17 BY MR. OPPENHEIMER:

18 Q. Do you know which of the exchanges that
19 Professor Yadav said had no indication of being
20 located in the United States?

21 A. Sitting here today I don't recall, but I
22 could look it up.

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1 Q. Okay. Let's take a look in Exhibit A,
2 which begins at page 61 of her report.

3 It starts with Binance. Not Binance.US,
4 but Binance. Do you see that on page 61?

5 A. I see it.

6 Q. And your rebuttal report is not offering an
7 opinion about where Binance is located, is it?

8 A. That's correct. My report talks about
9 Binance.US.

10 Q. Okay. Page 62, the exchanges listed on
11 this page are bitbank, Bitfinex, and BitForex. Your
12 rebuttal opinion doesn't address those exchanges,
13 does it?

14 A. That's correct.

15 Q. Page 63, Bithumb and Bitlish, your opinion
16 doesn't address those exchanges, does it?

17 A. That's correct.

18 Q. Page 64, BitMart, Bitmax, and Bittrue, your
19 opinion doesn't address those exchanges, does it?

20 A. That's correct.

21 Q. Page 65, the first one listed is Bitstamp.
22 Your opinion does not address Bitstamp, does it?

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1 A. It does not.

2 Q. I think you mentioned Bittrex, so we can
3 skip that one and come back to it.

4 A. Correct.

5 Q. On page 66 the first one listed is BW and
6 the last one listed is CoinBene. Your opinion does
7 not address either of those two; right?

8 A. Yes. That's correct.

9 Q. Page 67, Coinone, DigiFinex, HitBTC, your
10 opinion doesn't address those three, does it?

11 A. That's correct.

12 Q. Page 68, Huobi Global, your opinion does
13 not address that exchange, does it?

14 A. That's correct.

15 Q. Page 69, Korbit, your opinion does not
16 address that exchange, does it?

17 A. That's correct.

18 Q. Page 71 --

19 A. So skipping over Kraken.

20 Q. Skipping Kraken, which I think you
21 mentioned. We'll go to page 71. The first one
22 listed here is Aux Cayes Fintech Co. Your opinion

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1 doesn't address that change, does it?

2 A. That's correct.

3 Q. Page 72, Upbit, ZB, and ZBG, your opinion
4 does not address those three exchanges, does it?

5 A. Yes. That's correct.

6 Q. Okay. Let's go to the exchanges that you
7 do address. And looking at your rebuttal report,
8 Exhibit 160. At page 2, line 1, what you say is
9 "For all five exchanges above, I use an additional
10 method to confirm their location."

11 And in particular your additional method is
12 looking at their server authentication certificates;
13 is that right?

14 A. Yes, that's correct.

15 Q. The server authentication certificates
16 don't have to be registered to the same location
17 where an exchange keeps its central limit order
18 book, do they?

19 MR. TAYLOR-COPELAND: Objection.

20 THE WITNESS: By "keep," you mean running
21 the code that implements the CLOB, Central Limit
22 Order Book, C-L-O-B.

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1 BY MR. OPPENHEIMER:

2 Q. Let's start with that. The server
3 authentication certificates don't have to be
4 registered to the same server where they're running
5 code for the Central Limit Order Book; right?

6 MR. TAYLOR-COPELAND: Objection.

7 THE WITNESS: And if you mean the same
8 physical machine, the answer is no.

9 BY MR. OPPENHEIMER:

10 Q. In fact, they don't even have to be in the
11 same country as any machines running the Central
12 Limit Order Book; right?

13 A. So the users' interaction with it would
14 have to go through that server. So it's the first
15 stop. What happens behind the scenes if there is
16 redirects of traffic or offloading of computation
17 elsewhere, that's correct. The certificate will not
18 tell you what physical machine is actually doing the
19 computation. It will only tell you where your
20 packet ends up.

21 Q. Are you offering an opinion in this case
22 that the location of an exchange's servers is

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1 relevant to where transactions on that exchange take
2 place?

3 MR. TAYLOR-COPELAND: Objection. Calls for
4 a legal conclusion.

5 THE WITNESS: So the opinion I'm
6 offering -- I was asked to determine -- or what
7 evidence there was that these companies operated in
8 the United States. And so that's -- I looked at the
9 certificates and I report that in my report.

10 BY MR. OPPENHEIMER:

11 Q. Take a look at page 1 of your rebuttal
12 report, starting at line 12. You write, "While
13 Professor Yadav does not perform any analysis of
14 Binance.US, the same factors utilized in her
15 analysis of the other US-based exchanges show that
16 Binance.US is also based in the United States."

17 Do you see that?

18 A. I see.

19 Q. Was there anything preventing you from
20 analyzing where Binance.US was located at the time
21 you wrote your original report?

22 A. By that you refer to Exhibit 159?

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1 Q. Yeah.

2 A. So your question is could I have determined
3 where Binance.US was located at the time I wrote my
4 expert report?

5 Q. Yes.

6 A. So the evidence that I used has dates on
7 it. So the certificate that I used was valid as of
8 11 August 2023 and the MSB registration was signed
9 in October of 2022. So I'm bad with dates, but I
10 think that maybe that MSB was available at the time
11 I wrote the report, but maybe not the certificate.
12 Is that the question?

13 Q. I think you just said the certificate was
14 valid as of 11 November 2023?

15 A. That's correct.

16 Q. Today is October 20, 2023; right?

17 A. That's correct.

18 Q. So it is a future-dated certificate;
19 correct?

20 A. Future from today or future from when I
21 wrote the report?

22 Q. Well, let's start with from today.

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1 November 11 is in the future compared to
2 October 20 today; right?

3 A. I said August 11. Sorry.

4 Q. Oh, okay.

5 A. Canadian accent.

6 Q. Thank you.

7 At the time you submitted your initial
8 report in this case, were you able to go and look up
9 facts about where Binance.US was located?

10 A. So this methodology was available to me at
11 the time that I wrote this report. I did not look
12 at it at the time of the report. And the basis for
13 that information, I don't know if that existed at
14 the time of the report, but the methodology was
15 available.

16 Q. At the end of that paragraph we were just
17 looking at in Exhibit 160, so lines 14 through 16,
18 you've got a parenthetical that lists some facts
19 about Binance.US's location. You didn't include any
20 citations accompanying that paragraph, did you?

21 MR. TAYLOR-COPELAND: Objection.

22 BY MR. OPPENHEIMER:

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1 Q. I'm sorry. Accompanying that parenthetical
2 in that paragraph?

3 MR. TAYLOR-COPELAND: Misstates the
4 document.

5 THE WITNESS: Yeah. There is no citation
6 to that.

7 BY MR. OPPENHEIMER:

8 Q. Okay. And none of the materials that you
9 listed in the appendix list of materials
10 considered -- list of additional materials
11 considered -- strike that. Let me ask you a
12 different way.

13 Your list of materials considered does not
14 include the things referenced in this parenthetical
15 such as the terms of service for Binance.US; right?

16 MR. TAYLOR-COPELAND: Objection.

17 THE WITNESS: So I believe that it is
18 included in online materials, Binance.US, I believe
19 that that's the location of this.

20 Let me just repeat it. I believe that when
21 I cited the website Binance.US, the terms of service
22 are on that website.

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1 BY MR. OPPENHEIMER:

2 Q. Now, you're talking about dates from server
3 certificates a minute ago. I want to return to
4 that.

5 A. Yeah.

6 Q. None of the server certificates you discuss
7 in your rebuttal report come from before 2019, do
8 they?

9 A. That looks to be correct.

10 Q. I'll point you to the Poloniex certificate
11 that you describe on page 3, lines 13 to 14. You
12 describe the dates on that one as July 2019 through
13 July 2021. Do you see that?

14 A. I do see it.

15 Q. Other than that Poloniex certificate, none
16 of the server certificates you describe in your
17 rebuttal report come from earlier than 2023; is that
18 right?

19 A. That looks to be correct.

20 Q. Was there anything stopping you from trying
21 to find earlier server certificates?

22 A. Nothing stopping me from trying to find

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1 those certificates.

2 Q. Did you try to find them?

3 A. Yes.

4 Q. Were you able to find them?

5 A. Probably. I included one certificate for
6 each. I think -- my recollection is that I might
7 have tried to include the most recent one for each.

8 Q. Do you know when the class period in this
9 case started?

10 A. Not off the top of my head.

11 Q. I'll represent to you that the class period
12 begins in 2017 for this case.

13 Sitting here today with the materials in
14 your rebuttal report, you're unable to say where the
15 server certificates were located for any exchange in
16 2017; right?

17 MR. TAYLOR-COPELAND: Objection.

18 THE WITNESS: So what I can say is that the
19 certificates that I included had a validity period
20 that was after 2017.

21 BY MR. OPPENHEIMER:

22 Q. Sitting here today you're unable to say

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1 where the server certificates reported physical
2 locations for any of these five exchanges that
3 you're looking at in 2017; right?

4 MR. TAYLOR-COPELAND: Objection.

5 THE WITNESS: So it's not included in the
6 rebuttal report.

7 BY MR. OPPENHEIMER:

8 Q. And as to Coinbase, Kraken, Bittrex, and
9 Binance.US, sitting here today you're unable to say
10 where the server certificates were located at any
11 time before 2023; right?

12 MR. TAYLOR-COPELAND: Objection.

13 THE WITNESS: So it's not something I opine
14 on in the expert report.

15 BY MR. OPPENHEIMER:

16 Q. Okay.

17 A. But it does -- it says where the company --
18 like the company lists its address. I mean, it is
19 what it is.

20 Q. Well, the company lists its address in the
21 current 2023 server certificates that you've looked
22 at; right?

1 A. It does list its address in the
2 certificates that I've looked at, including my
3 report.

4 Q. And sitting here today you don't know
5 whether they listed the same address in previous
6 certificates, do you?

7 A. Yeah. So I don't recall that detail.

8 Q. Okay. And it's not in your report?

9 A. And it's not in my report.

10 Q. I notice you have a white binder in front
11 of you that I don't think we gave to you. What is
12 in the white binder?

13 A. So it's a copy of my expert report.

14 Q. Is that it?

15 A. Yes. With tabs. It's unmarked. There is
16 no notes or marking or anything. And you're free to
17 take it with you if you want.

18 Q. Thanks. I have plenty of paper.

19 Let's turn to your opening report in this
20 case. Exhibit 159, I believe.

21 Now, in this report you were forming
22 opinions about similarities and differences between

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1 the XRP Ledger, Bitcoin, and Ethereum; is that
2 right?

3 A. Yes. That's correct. Most of my opinions
4 relate to that.

5 Q. And your conclusions on the relationship
6 between these -- strike that.

7 Your conclusions about these three
8 different blockchain systems involve how centralized
9 or decentralized the XRP Ledger is relative to
10 Bitcoin and Ethereum; is that right?

11 MR. TAYLOR-COPELAND: Objection.

12 THE WITNESS: So I don't believe I opine on
13 how decentralized a system is. That's a term that's
14 hard to define.

15 BY MR. OPPENHEIMER:

16 Q. So you're not opining on centralization.
17 You're just opining on how these three systems
18 compare to each other?

19 MR. TAYLOR-COPELAND: Objection.

20 THE WITNESS: So definitely my opinions are
21 relevant. I mean, I address issues of
22 centralization. But if you say how decentralized a

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1 system is, that to me is a terminology that is hard
2 to define. And so it would normally be broken down
3 into components. And so I just -- I talk about the
4 components that would go into those definitions
5 without ever using that term, the way that you used
6 it.

7 BY MR. OPPENHEIMER:

8 Q. Okay. So I just want to make sure I
9 understand.

10 A. Yes.

11 Q. Your opinion here, your report does talk
12 about centralization of these three different
13 blockchain systems; right?

14 MR. TAYLOR-COPELAND: Objection.

15 THE WITNESS: So the concept of
16 centralization is something that's covered in my
17 report.

18 BY MR. OPPENHEIMER:

19 Q. And your report compares different aspects
20 of these three different blockchains through the
21 lens of centralization; right?

22 MR. TAYLOR-COPELAND: Objection.

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1 THE WITNESS: Okay. So I agree with the
2 first part. It does compare the three systems. It
3 compares them along the dimensions that I compare
4 them in the report. Whether you decide that's
5 through the lens of centralization, that's more of a
6 subjective thing.

7 So some -- I think some experts might look
8 at the report and say that it is trying to say
9 something about decentralization versus
10 centralization. Others might not think that.
11 They're not terms that I use. Or I don't use them
12 to describe a complete system.

13 So, for example, I might use the term
14 decentralize trust. A system could exhibit
15 decentralized trust, but that doesn't mean the
16 system is decentralized under every definition that
17 there is in the academic literature about
18 decentralization, because decentralization would try
19 to cover every aspect of the system. So I'm picking
20 on the specific -- what I think are the key areas to
21 look at.

22 BY MR. OPPENHEIMER:

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1 Q. So you're looking at certain specific areas
2 for these three blockchains and comparing them in
3 terms of centralization on those particular metrics;
4 is that right?

5 MR. TAYLOR-COPELAND: Objection.

6 THE WITNESS: So the point of comparison I
7 make is on who you have to trust and whether that's
8 a single entity or if it is multiple entities. And
9 so you could describe that as centralization. I
10 think it is a natural way to say that if you rely on
11 a single party that that exhibits centralized trust.
12 But the language you're using and the language
13 that's used in the report are different. So I'm
14 just -- I'm trying not to -- anyway, I'll just end
15 the question there.

16 BY MR. OPPENHEIMER:

17 Q. I'm not trying to mischaracterizes our
18 report. I'm trying to understand, because you just
19 said earlier that your report does deal with
20 centralization. So I'm trying to understand how.
21 What role does centralization play in your
22 analysis here?

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1 MR. TAYLOR-COPELAND: Objection.

2 THE WITNESS: Can you -- you can't define
3 centralization for me?

4 BY MR. OPPENHEIMER:

5 Q. Well, you said that it's relevant to your
6 report. I think you said the concept of
7 centralization is something that's covered in my
8 report. So I'm asking you what role is that playing
9 in your report?

10 MR. TAYLOR-COPELAND: Objection.

11 THE WITNESS: Okay. So the report opinions
12 demonstrate that there is a difference between XRP
13 Ledger and Bitcoin Ethereum in terms of what
14 entities you need to trust. If there is a single
15 entity that you need to trust, then you might say
16 that that exhibits centralized trust.

17 So any opinion that I have, for example,
18 that deals with a single entity being a trusted
19 entity could be described as saying that the system
20 exhibits centralized trust. But I don't believe I
21 use the term centralized trust.

22 BY MR. OPPENHEIMER:

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1 Q. Are you offering an opinion that anyone who
2 bought or sold XRP had to trust Ripple Labs?

3 MR. TAYLOR-COPELAND: Objection.

4 THE WITNESS: So there are things in my
5 report that a person who would purchase XRP would
6 have to do that would result in a trust of Ripple
7 Labs.

8 BY MR. OPPENHEIMER:

9 Q. I don't think that answers my question.
10 Are you offering an opinion that anyone who
11 bought or sold XRP had to trust Ripple Labs?

12 MR. TAYLOR-COPELAND: Objection. Calls for
13 speculation.

14 THE WITNESS: I believe it's possible to
15 purchase Ripple without trusting Ripple Labs or even
16 knowing who Ripple Labs is. So I guess I would
17 answer no.

18 BY MR. OPPENHEIMER:

19 Q. Okay. And just to be clear, you said
20 purchase Ripple. Do you mean purchase XRP?

21 A. Yes. Sorry.

22 Q. No worries.

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1 Now, you're not offering any opinions in
2 your expert report about whether XRP is an
3 investment contract; right?

4 A. That sounds like a legal opinion, and I
5 don't provide a legal opinion.

6 Q. You're not offering any opinions about the
7 beliefs held by any person who bought XRP during the
8 class period, are you?

9 A. So that would call for speculation as to
10 people's motives, and I don't believe that that's
11 contained in my report.

12 Q. And you're not offering opinions about what
13 a reasonable or hypothetical person evaluating XRP
14 or the XRP Ledger during the class period would have
15 believed, are you?

16 MR. TAYLOR-COPELAND: Objection.

17 THE WITNESS: Would -- can you clarify
18 would have believed about what? Like what they
19 would believe in general or what they would have
20 believed about?

21 BY MR. OPPENHEIMER:

22 Q. Are you offering any opinions about what a

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1 reasonable person evaluating XRP or the XRP Ledger
2 during the class period would have thought about XRP
3 or the XRP Ledger or Ripple?

4 A. What they would have thought about it, no,
5 I'm not.

6 Q. Are you offering any opinion about whether
7 it was reasonable for purchasers of XRP to expect
8 profits as a result of Ripple's efforts while buying
9 XRP?

10 A. Can -- I'm sorry. Can you just repeat it?

11 Q. Are you offering any opinion about whether
12 it was reasonable for purchasers of XRP to expect
13 profits as a result of Ripple's efforts when they
14 bought XRP?

15 MR. TAYLOR-COPELAND: Objection. Calls for
16 a legal conclusion.

17 THE WITNESS: So it is certainly not
18 contained in my report.

19 BY MR. OPPENHEIMER:

20 Q. Okay. You aren't opining on the reasons
21 why anyone might have bought XRP during the class
22 period, are you?

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1 MR. TAYLOR-COPELAND: Same objection.

2 THE WITNESS: So that's not an opinion that
3 I offer in my report.

4 BY MR. OPPENHEIMER:

5 Q. You're not offering any opinion about what
6 Ripple's motives were in selling XRP, are you?

7 A. To clarify, you mean Ripple Labs, the
8 company?

9 Q. Correct.

10 A. That's correct, it is not in the report.

11 Q. And you're not offering any opinion about
12 whether anyone who purchased XRP entered into a
13 common enterprise with Ripple Labs or anyone else,
14 are you?

15 MR. TAYLOR-COPELAND: Objection.

16 THE WITNESS: That sounds like a legal
17 definition. I don't know what a common enterprise
18 is, so no.

19 BY MR. OPPENHEIMER:

20 Q. If you look at page 6, line 3, of your
21 report under "Principles and methods," your first
22 sentence says, "For purposes of this report, I

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1 reviewed portions of the XRP Ledger code known as
2 rippled."

3 Do you see that?

4 A. I do.

5 Q. Which version or versions of the rippled
6 code did you review?

7 A. So I can narrow it down to the code that
8 would have been the latest copy between the dates
9 February and May 2023, but I don't have -- I don't
10 recall the version number.

11 Q. Okay. So you didn't look at earlier
12 versions before February of 2023; is that right?

13 A. No, that's not what I'm saying.

14 Q. Well, my question for you is: Which
15 versions of the rippled code did you review?

16 A. So I relied on the versions that were in
17 that time period. I think -- so I can't sit here
18 today and say that I never looked at rippled's code
19 before those dates.

20 Q. Can you tell me which versions you did look
21 at?

22 A. Can I give you the version number that I

1 used to rely on this report or every time I've
2 looked at the code ever?

3 Q. Let's start with what you relied on for
4 this report. Can you tell me which versions you
5 used, even if you're not using version numbers, if
6 you're identifying it in some other way?

7 A. Yeah. So the -- it would have been the
8 most recent version as of those dates.

9 Q. Okay. So just that one most recent
10 version?

11 A. Correct. That's correct.

12 Q. You didn't look at prior or superceded
13 versions of the rippled code, did you?

14 A. So "look at" is sort of a problematic word,
15 I guess, because yes, I did look at those, yes.

16 Q. But you didn't rely on those to form your
17 opinions; right?

18 A. So what I referenced is the latest version,
19 but sometimes you might look at the -- what's called
20 the commit history of a file to see how that file
21 changed over time, so that would be reflecting some
22 older versions of the code. So I wouldn't narrow it

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1 down to I only looked at these versions, like
2 nothing that I say is not in consideration of older
3 versions of the code.

4 Q. Which older versions of the code did you
5 consider?

6 A. So my approach to viewing the code would be
7 more to look at a file. So, for example, one key
8 file that I examined is the configuration file that
9 defines what's called the dUNL distribution points.

10 And so just as an example in that case, I
11 would look at the commit history of that and so I
12 would see every version. Every time that file
13 changed -- so if there was a version that did not
14 make a change to that file, I didn't look at that
15 version, right, but I would look at the full history
16 of that.

17 Q. Your report says you reviewed portions of
18 the XRP Ledger code. Which portions did you review?

19 A. So that was the main -- that was the most
20 significant file that I looked at.

21 Q. Do you recall any other files that you
22 reviewed other than the configuration file?

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1 A. Not sitting here today. I know that there
2 is more that I looked at for sure, but I couldn't
3 give you the names of what I looked at.

4 Q. Did you look at the entirety of the
5 configuration file when you were forming your
6 opinions in this case?

7 A. Did I read it from top to bottom, yes, I
8 believe I did.

9 Q. Okay. What was the earliest version of the
10 configuration file that you looked at?

11 A. I can't be confident sitting here today. I
12 suspect that it existed since the very first version
13 of Ripple that was in the repository.

14 Q. But you're not sure one way or another?

15 A. But I'm not sure. I can't say with
16 certainty.

17 Q. And you didn't list it in your report?

18 A. Yeah. That's correct. So what I relied on
19 in the report for the conclusions that I formed were
20 based just on the current version as of when I wrote
21 the report plus or minus a couple months, because it
22 took a couple months to write the report.

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1 Q. It's fair to say sitting here today you
2 don't know all of the different ways that the
3 rippled code changed over the course of the class
4 period in this case. Is that fair?

5 A. Can you define the class period?

6 Q. Do you know what the class period dates
7 are?

8 A. Sitting here today I do not.

9 Q. Okay. Did you know at some point?

10 A. I'm sure it was in the disclosure that was
11 given to me by counsel. For example, the complaint
12 I'm sure had those dates. I just don't recall them
13 sitting here today.

14 Q. Okay. I'm also going from memory, but I'll
15 represent to you it is approximately July of 2017
16 until July of 2023.

17 A. Okay. Perfect. So to answer your
18 question --

19 MR. TAYLOR-COPELAND: June of 2023, just
20 for the record.

21 BY MR. OPPENHEIMER:

22 Q. June of 2023 is the cutoff. So July of

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1 2017 until June of 2023.

2 A. No, I do not know every change that was
3 made to the Ripple code during that time period.

4 Q. Okay.

5 A. And I did not try to know that information.

6 Q. All right. So looking back at page 6 of
7 your report, at lines 4 through 6, you say, towards
8 the end of line 4, "for critical facts, I examined
9 the software using a time-box method to confirm the
10 critical fact before including it in this report."

11 Do you see that?

12 A. I do.

13 Q. How did you determine which facts were
14 critical?

15 A. So if I needed to look at the code to form
16 the opinion -- so it was driven by the opinion that
17 I was forming. And at certain points I felt that it
18 was critical to look at the code. So that -- it
19 wasn't that I started with the code and then formed
20 the opinions; it was the opposite. I barely looked
21 at the code.

22 Q. Got it.

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1 A. I barely felt the need to look at the code.

2 Q. Which facts did you determine were critical
3 for your opinion?

4 A. So an example of a fact that I determined
5 that was critical is how this dUNL was distributed
6 exactly precisely. So not just an English language
7 description that would be included in the developer
8 guide, but to actually see concretely mechanically
9 at a programming level how it worked.

10 Q. Were there any other facts that you
11 determined were critical?

12 A. So that's the one that I remember sitting
13 here today. There certainly could be others in my
14 report that I can't recall.

15 Q. Sitting here right now it is just the
16 distribution of the dUNL is the only one you recall
17 verifying in the software?

18 A. That's correct. But I wouldn't
19 characterize it as verifying, like verifying what.
20 I just said that I looked at that code.

21 Q. Okay. You looked at the code in relation
22 to that fact, and that is the only fact that you

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1 recall doing that for; is that right?

2 A. That's correct.

3 Q. You also mentioned the time-box method.

4 That's not a computer science term. It's a time
5 management term; right?

6 A. So it is used by auditors of software, so
7 it is actually a very common term that's used when
8 people audit software. So I know a lot of -- like
9 my students, for example, work at auditing firms and
10 so they -- that's just a term -- it's just a fancy
11 term -- it's actually a disclaimer. So it is
12 basically just saying you can't possibly understand
13 all of there is to understand about the code. And
14 so the best that you can do is that you can limit
15 the amount of time that you look at it and learn
16 what you can within that particular amount of time.

17 Q. So the idea of the time-box method is you
18 set aside a certain amount of time to do the task,
19 and once that time is over, you stop regardless of
20 how far you've gotten?

21 A. So the stopping condition doesn't
22 necessarily have to be predefined. So usually this

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1 arises because someone is paying and the payment is
2 made per hour. And so if I hire you to audit my
3 code, we'll have a set number of hours and so that
4 would dictate the stopping condition.

5 But it's not -- I mean, you're representing
6 it as the potential that there is some serious
7 problem and I'm starting to discover it, but then
8 the clock says to stop and so I don't investigate it
9 further. So that's my understanding. A respectful
10 audit firm would never do that.

11 Q. How much time did you spend reviewing this
12 software in connection with the critical fact you
13 mentioned on how the dUNL was distributed?

14 A. So I don't recall exactly, but I would put
15 it on the order of more than an hour and less than
16 ten hours.

17 Q. If you flip back to page 5 of your report,
18 in line 17 through 18 you write, "I also reviewed
19 the technical details of Bitcoin and Ethereum as
20 necessary."

21 What details of Bitcoin and Ethereum were
22 necessary for you to review?

1 A. So I maybe can't give you like a full
2 enumeration of everything, but I can give you some
3 examples.

4 Q. As best as you recall sitting here today,
5 what were the critical -- or sorry -- what were the
6 details of Bitcoin and Ethereum that you reviewed?

7 A. Okay. So if you turn to -- let's just
8 start on page 42. So this is the appendix in my
9 report that goes through the cryptographic
10 properties and primitives that are associated.

11 So there is small details. Like, for
12 example, let's take line 19. "As of February 2023,
13 the SHA2 family of hash functions are considered
14 collision resistant and pre-image resistant by
15 NIST," N-I-S-T.

16 Okay. So the date February 2023 would not
17 be something that I knew off the top of my head.
18 That's an example of something that I have to look
19 up.

20 A lot of this was drawn from my course, and
21 so I don't know if that counts. Like if I refer to
22 my course notes, then I would say this entire

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1 section was in reference to it. By this entire
2 section, I should say all of appendix A.1.

3 Details such as on page 46, there is an
4 equation that says blockHeader -- on line 23, near
5 the bottom of the page, blockHeader equals the hash
6 of Merkle root -- maybe I shouldn't read it.
7 Everyone can see it.

8 These are the type of details that I would
9 just double-check.

10 Another example would be on the next page,
11 47. There is -- it says, "For Alice to have BTC,"
12 and the sentence goes on. There is a technical name
13 of a curve that's used. So I would just
14 double-check that I -- I know that it is secp256k1
15 off the top of my head, but I want it to be
16 technical and so I want to denote it exactly
17 correct.

18 I don't know if you want me to continue
19 because there is literally things like that on every
20 page.

21 Q. I think for the court reporter's benefit,
22 we can stop there.

1 (Reporter clarification.)

2 Q. Now, you listed five conclusions in this
3 report. What methodology, if any, did you use to
4 reach those conclusions?

5 A. I don't have the name of a methodology that
6 was used to reach those conclusions.

7 Q. What did you do?

8 A. So I spent a long time reading about Ripple
9 Labs, reading about the XRP Ledger, how it worked.
10 And then these were my conclusions after reading it.

11 Q. Okay. If I can direct you --

12 A. I could say that I read it with an eye
13 toward what I was asked to do, which is to look at
14 points of comparison between Bitcoin and Ethereum.
15 So the appendix is sort of just a run-through of all
16 three protocols. And then the opinions are the
17 points where I saw that there were differences
18 between the three.

19 So I guess my methodology was to try to
20 articulate every aspect of the system designed for
21 all three, then ask myself are they the same or are
22 they different. And then if they're materially

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1 different, then I presented it in section 4.

2 Q. Now, you haven't listed every difference
3 between the three systems in your report; right?

4 A. There are differences between the three
5 systems that would not be contained in my report.

6 Q. And in areas where the three systems are
7 similar, you haven't offered opinions on the
8 similarities. You're focusing on the differences.
9 Is that fair?

10 MR. TAYLOR-COPELAND: Objection.

11 THE WITNESS: I do believe in many places
12 will call it where they're similar, as well as the
13 differences.

14 BY MR. OPPENHEIMER:

15 Q. And you've got five opinions that you
16 numbered opinion 1 through opinion 5.

17 A. So --

18 Q. Let me finish.

19 None of -- you're not offering any opinions
20 where you say Bitcoin, Ethereum, and the XRP Ledger
21 are similar in the following ways, do you?

22 A. I guess I do.

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1 Q. You do or do not --

2 A. I do.

3 Q. -- offer opinions saying where they're
4 similar?

5 A. I guess I -- I do.

6 Q. Can you point me to where?

7 A. Sure. So maybe on page 35, line 25. It
8 says, "The method for allocating XRP in the XRP
9 Ledger is materially different than BTC and Bitcoin,
10 and somewhat different from ETH in Ethereum."

11 So that's an example where I felt that
12 there wasn't a material difference between XRP and
13 ETH, for example. So they're similar in that
14 regard.

15 Q. What about aspects where all three of the
16 blockchains are generally similar, you don't focus
17 on any of those in here, do you?

18 MR. TAYLOR-COPELAND: Objection.

19 THE WITNESS: The last part of your
20 question was "in here." Do you mean just in
21 section 4 or do you mean in the report?

22 BY MR. OPPENHEIMER:

1 Q. In the report.

2 A. So yes, no, I would say that I do focus on
3 that in the report.

4 Q. All three blockchains, just to take one
5 example, are run on the public Internet; right?

6 A. That's correct.

7 Q. You don't offer an opinion saying that that
8 is one area of similarity, do you?

9 A. So I suspect that I do say that, but I can
10 go through the report to try to find it.

11 Q. Maybe we're not communicating all the way
12 here. You've got five opinions that are numbered
13 opinion 1 through opinion 5.

14 A. That's correct.

15 Q. And I'm focusing on those things that
16 you've highlighted as opinions in your report.

17 A. Yes.

18 Q. Those opinions are focused on what's
19 different between the three blockchains, not what's
20 the same; is that right?

21 A. Okay. So the idea of focus implies that I
22 picked five things that were different between them.

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1 The opinions are the opinions because they seem
2 relevant to what I was asked to do. So that's why
3 they're opinions. And it is true that in almost all
4 of the five opinions a difference between XRP and
5 Bitcoin or Ethereum -- and/or Ethereum is
6 highlighted.

7 Q. Okay.

8 A. But the report itself, especially if you
9 read the appendix, there is many places in the
10 report where it talks about the similarities between
11 the three systems.

12 Q. So let me point you to page 7 now at
13 lines 2 through 4. On those lines what you write
14 is, "I have been asked by counsel for lead plaintiff
15 to analyze Ripple Labs' role in the creation, the
16 creation, and functioning of the XRP Ledger protocol
17 and to compare the XRP Ledger protocol to Bitcoin
18 and Ethereum, the two most prominent blockchain
19 technologies."

20 Do you see that?

21 A. I do.

22 Q. Are you offering an opinion in this case

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1 that Ripple Labs played a significant role in the
2 creation of the XRP Ledger protocol?

3 MR. TAYLOR-COPELAND: Objection.

4 THE WITNESS: So the report, it talks about
5 the creation of the XRP Ledger. I understand that
6 it was created by what was -- what is now called the
7 company Ripple Labs.

8 BY MR. OPPENHEIMER:

9 Q. And what was Ripple Labs' role or its
10 predecessor, its corporate predecessor, if
11 applicable, what was the role of Ripple Labs or its
12 corporate predecessors in creating the XRP Ledger
13 protocol?

14 MR. TAYLOR-COPELAND: Objection.

15 THE WITNESS: So my understanding is that
16 there were a set of individuals that worked on the
17 code rippled around the same time -- or
18 simultaneously they were also working on
19 establishing a company, which is now called Ripple
20 Labs. And my understanding is that the rippled code
21 was copyrighted to Ripple Labs.

22 BY MR. OPPENHEIMER:

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1 Q. Do you know when Ripple Labs was formed?

2 A. Sitting here today I don't know the exact
3 dates, but -- first off, can I clarify? Do you mean
4 when NewCoin was formed or when Ripple Labs -- when
5 NewCoin became Ripple Labs?

6 Q. We can call it when NewCoin was formed.
7 When the predecessor entity of what is now called
8 Ripple Labs was formed.

9 A. I don't know the date off the top of my
10 head.

11 Q. Do you know when the bulk of the coding for
12 the XRP Ledger protocol was completed?

13 MR. TAYLOR-COPELAND: Objection.

14 THE WITNESS: So I didn't observe the
15 creation of it. It happened behind scenes. I was
16 shown a disclosure that included some email
17 discussions from a time period that was -- I would
18 describe it as maybe roughly a year before the
19 incorporation of Ripple Labs. And based on those
20 emails, I came to understand that they were working
21 on, as you described it, the bulk of the coding.
22 But I don't -- I don't have any specific knowledge

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1 and I'm not opining on that in the report. It is
2 not anywhere in the report.

3 BY MR. OPPENHEIMER:

4 Q. You say right here at the beginning of this
5 paragraph that you were asked by lead plaintiff to
6 analyze Ripple Labs' role in the creation of the XRP
7 Ledger protocol.

8 So my question is: Are you offering an
9 opinion in this case that Ripple Labs played a role
10 in the creation of the XRP Ledger protocol?

11 A. Okay. I understand now.

12 Okay. So this sentence refers to what I
13 was asked to do. So it's not me saying that it did.
14 What I say about the origins is completely contained
15 in -- I shouldn't say completely. I make reference
16 to the origins of it in appendix C. I'll find you
17 the exact page number.

18 Actually I think there is a better
19 location. Just give me a second. I think early.

20 So maybe the most direct statement would be
21 on page 24, line 24.

22 Q. For the record, what you wrote there is

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1 "The rippled code is the open-source code underlying
2 the XRP Ledger."

3 A. Yes. So the rest of the paragraph. I
4 don't know if you want to read it into the record.

5 Q. Okay. Based on the answer you just gave a
6 minute or two ago, it sounds like you agree that
7 much of the coding for the XRP Ledger protocol was
8 done before Ripple Labs or its predecessors were
9 formed; is that right?

10 MR. TAYLOR-COPELAND: Objection.

11 THE WITNESS: So when you say the
12 XRP Ledger, this goes back to your earlier point of
13 version numbers. So there was a version that was
14 released. So to my recollection sitting here today
15 is that the corporation was formed first. Then the
16 first version of the software was released after.
17 And so there was a time between those two events and
18 there was a time before the first event. I have no
19 knowledge of how -- what percentage of the code was
20 written in either of those two time periods.

21 BY MR. OPPENHEIMER:

22 Q. Okay. So let me direct you to page 5 of

1 your report, at line 19.

2 A. I see it.

3 Q. I want to ask you about appendix D here.

4 What you say in this paragraph is, "Additional
5 documents which I considered are itemized in
6 appendix D."

7 And the last sentence of the paragraph
8 says, "The documents in appendix D were not used as
9 a primary source for any facts or opinions in this
10 report."

11 So help me understand that. Are you saying
12 here that you're not directly relying on the
13 documents in appendix D?

14 A. So no. No.

15 Q. What do you mean in this sentence that we
16 just read?

17 A. So what I mean is that the documents that I
18 relied on show up in one of two places in this
19 report. To me, you know, what is in appendix D is
20 not something that I usually do as an academic, so
21 we would have just -- what is section -- the
22 reference section of the paper itself. And so I

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1 felt the need -- I don't know why -- to try and
2 explain why there was both a section called
3 references on page 39 and why there was also an
4 appendix D. They seem redundant.

5 And so the point of that paragraph is
6 essentially if I write a sentence and I wanted to
7 know exactly where that information came from, I
8 would put it in the references, but there is a lot
9 of general knowledge that I would write -- the
10 sentences that I would write I wouldn't necessarily
11 cite where it came from, but I did obviously learn
12 that somewhere. And so that would be what would be
13 in appendix D.

14 Q. Did you read all of the documents in
15 appendix D yourself?

16 A. So the documents in appendix D were
17 documents that were provided to me.

18 Q. By whom?

19 A. By counsel. Sorry. Let me say that
20 appendix D includes documents that were provided to
21 me by counsel.

22 Q. Did you read all of those documents?

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1 A. So we included everything that I might have
2 looked at. So I don't recall reading every single
3 document.

4 Q. Sitting here today are you able to tell
5 which ones you did read and which ones you didn't?

6 A. So I believe it's a pretty accurate count
7 of things that I would have at least looked at. If
8 you mean read top to bottom, that's -- I don't
9 recall which ones I did or didn't read top to
10 bottom, but a lot of this is automated. I don't
11 know if I can -- if this is like attorney work
12 privilege.

13 MR. TAYLOR-COPELAND: Don't talk about
14 anything we talked about.

15 THE WITNESS: No, it's not that. It's just
16 how -- okay. Anyways, I'll leave it there.

17 BY MR. OPPENHEIMER:

18 Q. I'm not asking you to disclose anything
19 privileged. Let's see if we can work through one
20 question at a time.

21 A. Sure.

22 Q. I think it's fair to say that you did not

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1 read every document listed in appendix D in their
2 entirety; right?

3 A. I think that's fair to say.

4 Q. Okay. And sitting here today you can't
5 identify which ones you did and which ones you did
6 not read in their entirety; right?

7 MR. TAYLOR-COPELAND: Objection.

8 THE WITNESS: So it's possible that I
9 could, but based on -- you know, if I see, for
10 example, on page 89, there is things that are titled
11 RPLI_03552149. Based on that description, I
12 couldn't tell you what that is, whether I read it in
13 its entirety or not.

14 BY MR. OPPENHEIMER:

15 Q. Okay. So putting aside the documents that
16 are identified by Bates number in section D.7, for
17 all of the other sections here, which ones did you
18 read top to bottom?

19 A. So I don't think there is a single document
20 that I truly read top to bottom.

21 Q. Okay. How did you decide which portions of
22 the documents to read?

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1 MR. TAYLOR-COPELAND: Objection. Again,
2 you shouldn't get into any discussions you had with
3 counsel in your answer to this.

4 THE WITNESS: Are you instructing me to
5 answer the question?

6 MR. TAYLOR-COPELAND: You can answer to the
7 extent it doesn't get into anything we discussed.

8 THE WITNESS: Okay. Can you repeat the
9 question?

10 BY MR. OPPENHEIMER:

11 Q. How did you decide which portions of the
12 documents to read?

13 A. So I mean, there is a bunch of different
14 ways that I would decide. So a lot of it was based
15 on keyword search. So if there was a particular
16 term that I was looking for, then I would search for
17 that term. It would return a bunch of documents.

18 The technical system that we use will flag
19 every document that I looked at. So it will
20 automatically get added to this report just because
21 I open that file in Everlaw or whatever. So that
22 that's one way.

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1 Q. Any other ways?

2 A. So I might be directed by counsel to look
3 at a particular document.

4 Q. Any other ways?

5 A. Those are the two that I can think of
6 sitting here today.

7 Q. So either keyword searches or counsel
8 direction --

9 A. Correct.

10 Q. -- was how you chose which portions to
11 read; is that correct?

12 MR. TAYLOR-COPELAND: Objection.

13 THE WITNESS: So that's correct.

14 MR. OPPENHEIMER: Okay. Why don't we take
15 a quick break here.

16 MR. TAYLOR-COPELAND: Sounds good.

17 THE VIDEOGRAPHER: Off the record,
18 11:19 a.m.

19 (Recess, 11:19 a.m. to 11:34 a.m.)

20 THE VIDEOGRAPHER: This begins media file
21 number 3, today's testimony of Jeremy Clark. We're
22 back on the record at 11:34 a.m.

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1 BY MR. OPPENHEIMER:

2 Q. You would agree that the XRP Ledger has
3 certain technical advantages compared to Bitcoin and
4 Ethereum; correct?

5 MR. TAYLOR-COPELAND: Objection.

6 THE WITNESS: So people might use the
7 XRP Ledger because it has technical advantages.

8 BY MR. OPPENHEIMER:

9 Q. You agree -- let's take it one step at a
10 time.

11 You agree that there are some technical
12 advantages of the XRP Ledger compared to Bitcoin and
13 Ethereum; right?

14 A. Yes, I agree with that.

15 Q. To take some examples, the XRP Ledger
16 processes transactions faster than Bitcoin and
17 Ethereum; right?

18 A. So let me see if I talk about that in my
19 report, which I think I do.

20 So I don't know if that's an opinion that
21 I'm offering in the report, but I do understand that
22 to be true.

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1 Q. Just to put some detail on it. You
2 understand that Bitcoin transactions can take about
3 an hour or so to become final; right?

4 A. If I can go back to your -- how about I
5 answer this question and then I go back to your
6 previous question.

7 Q. Yeah. Let's answer this one first.

8 A. Okay. The answer is actually probably it's
9 together. So on page 74 on line number 4. Okay.
10 The sentence starts with "Ledgers," and this is in
11 reference to XRP Ledger. So "Ledgers are produced
12 every 3 to 5 seconds, which is materially faster
13 than Bitcoin which targets a block every ten
14 minutes."

15 Your question is about blocks becoming
16 finalized after about an hour, which would be six
17 blocks. So that's something else I also would cover
18 in my report. I'll find it for you.

19 Q. We might be able to save some time. I
20 don't need the exact location of the report.

21 A. Okay.

22 Q. My question is just: Is it your

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1 understanding that Bitcoin transactions on the
2 Bitcoin blockchain take roughly an hour to become
3 final?

4 MR. TAYLOR-COPELAND: Objection.

5 THE WITNESS: Okay. So on page 49 is where
6 I discuss this. I think there is some nuance. I
7 know -- I know you just want a quick answer, but I
8 think the nuance is worth it.

9 So in this whole section starting from
10 line 1 to 14, I go through the idea of what's called
11 0-confirmed, 1-confirmed, 2-confirmed. And so what
12 you're describing waiting six blocks is mentioned in
13 line 10, which implies a one-hour wait for a Bitcoin
14 transaction to be fully confirmed. So that's
15 correct.

16 But it is the case that there are -- you
17 know, there are situations that I outline here where
18 you might not wait for a fully confirmed block. So
19 anyway, you're going to be waiting somewhere between
20 ten minutes and an hour.

21 BY MR. OPPENHEIMER:

22 Q. You agree that transactions on the

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1 XRP Ledger generally settle in about 3 to 5 seconds;
2 is that right?

3 A. So within 3 or 5 seconds a ledger becomes
4 finalized. And the definition of finalized is
5 something I go through. It's not the same as what
6 it means to be confirmed in Bitcoin. But local to
7 those systems, they're a definition of what becomes
8 final, the comparison would be that Bitcoin would
9 take an hour for the equivalent of what would be
10 3 to 5 seconds in XRP Ledger.

11 Q. Right. And the XRP Ledger can process a
12 greater volume of transactions at any given time
13 than Bitcoin; right?

14 MR. TAYLOR-COPELAND: Objection.

15 THE WITNESS: Okay. So the volume of
16 transactions is basically the size of a block
17 multiplied by how fast blocks are produced. So what
18 we've discussed so far is that XRP produces ledgers
19 faster than Bitcoin produces blocks. That doesn't
20 necessarily imply that the number of transactions is
21 different.

22 For example, if Bitcoin's blocks were way

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1 bigger -- so in an hour -- it would take an hour,
2 but they would settle a ton of transactions, whereas
3 XRP would have small ledgers that wouldn't. You
4 can't really say how big a transaction is because
5 the size is dependent on how complex the transaction
6 is. So transactions are not of a fixed size.

7 But with all that nuance aside, it's very
8 reasonable to say that XRP Ledger, you know, can
9 finalize transactions, the volume -- a higher volume
10 of transactions than Bitcoin.

11 BY MR. OPPENHEIMER:

12 Q. Okay. So some nuance to it. But you agree
13 that in general terms the XRP Ledger can process a
14 greater volume of transactions per unit of time than
15 the Bitcoin ledger?

16 A. That's right. So in my report I list what
17 that nuance is, and I do agree with that statement,
18 although it may not be contained in the report
19 itself.

20 Q. Would you also agree that the XRP Ledger
21 uses less computing power per transaction compared
22 to Bitcoin?

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1 MR. TAYLOR-COPELAND: Objection.

2 THE WITNESS: So again, there is a lot of
3 nuance. That question, you know, the -- the
4 computational work that I think you're referring to
5 in Bitcoin is not tied to the number of
6 transactions. So that is computational work that
7 has to be done, even if there is zero transactions
8 and there is what's called an empty block.

9 So I don't know if you want to rephrase
10 your question, but so the work -- I mean -- okay.
11 To directly answer your question, the amount to just
12 process the transaction itself would be about the
13 same between the two.

14 BY MR. OPPENHEIMER:

15 Q. To write one block on the Bitcoin ledger,
16 it requires a significant amount of electricity
17 through the proof of work mechanism; right?

18 A. That's correct.

19 Q. And approximately how many transactions are
20 contained in a typical Bitcoin block?

21 A. So I'll see if I have that in the report.

22 So I think it's not a number that I report

1 in it. My recollection sitting here today is it

2 would be in the range of 1,000, in the 1,000s.

3 Q. Right. And that's in a block that takes

4 about ten minutes; right?

5 A. So yes, a block is produced on --

6 approximately every ten minutes.

7 Q. Okay. Are you aware that the XRP Ledger

8 can record roughly 1,500 transactions per second?

9 A. So again, I don't know if that's a number
10 that I have in my report, but it sounds accurate.

11 Q. Okay. And are you aware that the amount of
12 electricity that is used for the XRP Ledger to write
13 ten minutes' worth of ledgers is less than the
14 amount of electricity that's used to write one block
15 on the Bitcoin blockchain through the proof of work
16 mechanism?

17 A. I'm sorry. Can you just repeat the
18 question?

19 Q. Are you aware that the amount of
20 electricity that is used for the XRP Ledger to write
21 ten minutes' worth of ledgers is less than the
22 amount of electricity that's used to write one block

1 on the Bitcoin blockchain with proof of work
2 mechanism?

3 A. So I'd say that's roughly correct.

4 Q. Do you agree that the cost to transact on
5 the XRP Ledger is generally lower than the cost of
6 transacting on the Bitcoin and Ethereum ledgers?

7 A. So my understanding is that fees on the
8 XRP Ledger are paid in XRP. Fees on the Bitcoin
9 blockchain are paid in BTC. And so you're assuming
10 an exchange rate between XRP and BTC, like what
11 would it cost in the equivalent of US dollars to
12 send a standard transaction on XRP versus Bitcoin.

13 Q. Let's start with that.

14 If you convert Bitcoin and XRP and Ethereum
15 into a fiat currency of your choosing -- US dollars,
16 Euros, Canadian dollars -- if you make that
17 conversion so that you're talking about the same
18 denominator for everything, the same unit for
19 everything, do you agree that transactions on the
20 XRP Ledger generally cost less than transactions on
21 the Bitcoin and Ethereum ledgers?

22 A. Okay. So my general understanding is that

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1 XRP is cheaper than Bitcoin. My general
2 understanding is that Ethereum is cheaper than
3 Bitcoin. It wouldn't surprise me to learn that XRP
4 is cheaper than Ethereum. I don't know that sitting
5 here today.

6 Q. Okay. Do you know approximately how much
7 Bitcoin cost to write a transaction on the Bitcoin
8 blockchain?

9 MR. TAYLOR-COPELAND: Objection.

10 THE WITNESS: So this isn't something
11 that's in my report. It's certainly something
12 that -- they're numbers that I have seen before. I
13 can't recall them sitting here today.

14 BY MR. OPPENHEIMER:

15 Q. Do you have a ballpark estimate? A tenth
16 of a Bitcoin, a hundredth, 20 Bitcoins?

17 MR. TAYLOR-COPELAND: Objection.

18 THE WITNESS: So it would be a small
19 fraction of a Bitcoin. I don't know what order of
20 magnitude exactly.

21 BY MR. OPPENHEIMER:

22 Q. Okay. Ripple does not own the XRP Ledger

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1 source code today; right?

2 MR. TAYLOR-COPELAND: Objection.

3 THE WITNESS: It sounds like a legal
4 question about ownership.

5 BY MR. OPPENHEIMER:

6 Q. Are you aware that the XRP Ledger code is
7 open source?

8 A. I am.

9 Q. And that means anyone can see it, copy it,
10 propose changes to it; right?

11 A. Are you asking whether that's a definition
12 of open-source software or whether that's true of
13 rippled software?

14 Q. I'm asking in practice, because the
15 XRP Ledger code is open source, anyone can see it
16 and copy it; right?

17 A. Anyone can see and copy the rippled source
18 code, yes.

19 Q. And anyone can propose changes to the
20 rippled source code; right?

21 A. So anyone can, what we say, submit a pull
22 request, which would be a technical way of saying

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1 that they can code up the changes that they'd like
2 to see reflected in the code. And then using the
3 hosting software -- so it's not a function of it
4 being open source. It's a function of it being on
5 the repository GitHub. Then there is a mechanism
6 for the people that control that repository to be
7 alerted to the fact that somebody would like to
8 change the code.

9 Q. And anyone who wants to is free to develop
10 applications to run on the XRP Ledger; right?

11 MR. TAYLOR-COPELAND: Objection.

12 THE WITNESS: Can you rephrase your
13 question? What do you mean by "run applications"?
14 You mean like a smart contract?

15 BY MR. OPPENHEIMER:

16 Q. You're familiar with the general notion of
17 developing applications that run on blockchain
18 technologies; right?

19 A. That's correct.

20 Q. You're aware that people have developed
21 applications for the Bitcoin ledger; right?

22 A. No, I'm not.

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1 Q. No? Are you aware that people have

2 developed applications for the XRP Ledger?

3 A. I am not.

4 Q. Did you look for any evidence of whether

5 people developed applications for the XRP Ledger in

6 connection with your report?

7 A. I did.

8 Q. And you were just unable to find one way or

9 the other?

10 A. No. I think the report covers the reason

11 why.

12 Q. So is it your belief that nobody has

13 developed any applications that run on the

14 XRP Ledger?

15 MR. TAYLOR-COPELAND: Objection.

16 THE WITNESS: So my belief is that the

17 XRP Ledger does not support smart contracts.

18 BY MR. OPPENHEIMER:

19 Q. I'm not asking just about smart contracts.

20 I'm asking about applications that people can

21 develop that run on the XRP Ledger technology.

22 MR. TAYLOR-COPELAND: Objection.

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1 BY MR. OPPENHEIMER:

2 Q. Is it your belief that nobody has developed
3 any such applications?

4 MR. TAYLOR-COPELAND: Objection.

5 THE WITNESS: Okay. So the question you're
6 asking now is not the question that you asked me
7 before. But the answer to your question now as you
8 phrase it today, which is on the XRP Ledger
9 technology, yes. People have run the applications
10 on the technology. That's different than the ledger
11 itself.

12 BY MR. OPPENHEIMER:

13 Q. Okay. And so let's turn to request that
14 question now. Is it your view that no one has
15 developed applications that run on the XRP Ledger
16 itself?

17 A. That's correct.

18 Q. Okay. And do you know whether anyone has
19 developed applications that run on the Ethereum
20 ledger?

21 A. I do.

22 Q. Have they?

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1 A. They have.

2 Q. Okay.

3 A. I have.

4 Q. Let's turn to page 31 of your opinion,
5 Exhibit 159. I want to start at 6 to 8, the opinion
6 that you list here says, "The XRP Ledger consensus
7 protocol requires validators to agree on a list of
8 trusted validators and use of the list published by
9 Ripple Labs is a de facto requirement."

10 Do you see that?

11 A. I do.

12 Q. I want to ask you a general computer
13 science question first, and I may hopelessly
14 misunderstand this, so feel me to correct me if I
15 get it wrong.

16 Are you familiar with something called the
17 FLP impossibility result?

18 A. It doesn't ring a bell.

19 Q. Are you familiar with a principal of
20 computer science that says it's impossible for a
21 decentralized system, like the XRP Ledger or
22 Bitcoin, to simultaneously guarantee liveness and

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1 safety?

2 A. So the only theorems that I rely on would
3 be the CAP theorem, which is stated differently than
4 what you just stated.

5 Q. Okay. So how would you state the CAP
6 theorem that you rely on?

7 A. Okay. So if you go to page 77. So line
8 number 11, it says, "Consider a network partition of
9 validators in a distributed system. Researchers
10 consider a common assertion called the CAP theorem
11 [citation 14], when reasoning about partitions and I
12 describe it informally as follows."

13 Do you want me to read into the record the
14 whole thing?

15 Q. I want you to just tell me how you
16 understand the CAP theorem. If that's reading it
17 into the record, that's fine. But what's your
18 understanding of it?

19 A. Okay. I'll just read it into the record
20 then. "As an example of a partition, partition
21 being the 'P' of CAP, assume half of the validators
22 are connected to each other on network A but

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1 inaccessible, directly or indirectly, from the other
2 half of validators which are" -- it should say
3 connected -- "amongst themselves on network B. The
4 theorem asserts that a system must sacrifice
5 consistency, which is the C, or availability, A, or
6 both." A system that prioritizes consistency over
7 availability might halt -- a system prioritizing
8 availability will continue but it will result in
9 inconsistency. That's a paraphrase.

10 Q. And so in this CAP theorem you're
11 describing there is a trade-off essentially between
12 consistency and availability; is that right?

13 A. That's roughly correct, yes.

14 Q. And --

15 A. Under a partition.

16 Q. And just to make sure we have the terms
17 clear, consistency refers to all of the network
18 participants agreeing with one another; is that
19 right?

20 A. That's correct.

21 Q. And availability refers to the network
22 actually processing transactions and moving forward

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1 with new transactions as they come up; is that
2 right?

3 A. Yes. That's right. I might add that your
4 question was phrased to me in terms of liveness and
5 safety. And so availability is roughly the same as
6 liveness, and safety is roughly the same as
7 consistency.

8 Q. Great. Thank you for that.

9 There is no requirement that a blockchain
10 ledger prioritize either liveness or availability on
11 one hand or safety or consistency on the other hand;
12 right?

13 MR. TAYLOR-COPELAND: Objection.

14 THE WITNESS: So there is no requirement
15 for anyone designing a blockchain system to
16 prioritize one or the other.

17 ///

18 BY MR. OPPENHEIMER:

19 Q. Okay. Now, are you opining that the actual
20 code of the XRP Ledger protocol, the rippled
21 protocol, forces validators to agree on a list of
22 trusted validators?

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1 A. I'm not.

2 Q. You're not offering an opinion that the
3 code itself somehow prohibits validators from
4 adopting a list that doesn't match a list that other
5 validators use; right?

6 MR. TAYLOR-COPELAND: Objection.

7 THE WITNESS: So I think it is easier to
8 just say what I am asserting, and so the word I use
9 is "requires." So the XRP consensus protocol
10 requires validators to agree -- you asked me about
11 forces, which to me is distinct from requires. And
12 in your last question you asked -- you used a
13 different verb. I forget what it was.

14 BY MR. OPPENHEIMER:

15 Q. So is it your opinion that the code of the
16 XRP Ledger protocol itself requires validators to
17 agree on a list of trusted validators?

18 A. Yes. It's a de facto requirement.

19 Q. Well, what do you mean when you say
20 de facto requirement?

21 A. So what I mean is there is a basis for
22 saying that it is required. Do you want me to go

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1 through the reasons?

2 Q. Let's take it one question at a time.

3 A. Sure.

4 Q. Let's say you run a validator and I run a
5 validator on the XRP Ledger. And I've set up my
6 list of trusted validators, whatever that list is.
7 Is there something in the code of the XRP Ledger
8 protocol that requires you to use the same list as
9 me just from the code itself?

10 A. So you're asking me either one of two
11 things. I'll just answer both of them.

12 So in general, code can't require you to do
13 anything. If you mean like it forces you, you can
14 always change code. If you have the source code,
15 like can you change source code? Yes. You can
16 change source code and run it any way you want.

17 And then the -- so in your scenario if you
18 just have a list, then the software doesn't know
19 about your list. So I don't even know about your
20 list so, of course, the software isn't forcing me to
21 use your list.

22 The point here is that it is forcing you

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1 not -- anyways, the point is the relationship
2 between the software and a list published by Ripple
3 Labs, which is not your list in this case. It's not
4 that two people -- it's not a question of whether
5 people come together and agree on lists. It's a
6 question of where do you get the default list from.

7 Q. Does the software prohibit people from
8 making changes to the default list?

9 A. If by prohibit you mean -- well, actually I
10 would say yes. Like so it recommends that you do
11 not change the list. So if that's a prohibition,
12 then yes, it prohibits you by saying that you should
13 not change this list.

14 Q. Do you think recommending not to change
15 something is the same as prohibiting someone from
16 changing it?

17 MR. TAYLOR-COPELAND: Objection.

18 THE WITNESS: So it sounds like maybe a
19 legal question. I mean, if you prohibit alcohol
20 does it mean that no one can drink alcohol? It does
21 not. It just says that you should not do something
22 and people could choose to follow that or not. So

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1 the code is saying don't change this list.

2 Is it technically possible to go in and
3 change the list? Yes.

4 ///

5 BY MR. OPPENHEIMER:

6 Q. What does the code actually say about
7 changing the list?

8 A. Good question. So I have some quotes in my
9 report itself. And it will just take me a minute to
10 find them.

11 So I'm going to give you an example. I'm
12 not saying that this is the only thing that it says.
13 Let's go to page 80, line 15.

14 "Changing the distribution points,"
15 that's -- the distribution points is my -- they use
16 a different word, but that's my interpretation of
17 what they meant -- "can cause your rippled instance
18 to see a validated ledger that contradicts other
19 rippled instances' validated ledgers (aka a ledger
20 fork) if your validators lists do not sufficiently
21 overlap with the lists used by others."

22 Q. Right. That language you just quoted

1 doesn't say if your validator list is not identical
2 to the list used by others; right?

3 A. It does not say -- it does not use the term
4 "identical." It uses the term "sufficiently
5 overlap."

6 Q. And, in fact, you quote the XRP Ledger
7 Foundation as saying that any overlap above
8 90 percent is completely safe from forking. That's
9 on page 26. Is that right?

10 A. So I'm looking at page 79, line 22. I
11 think that's the same quote, but I can go to your
12 page.

13 Q. You saw that quote from the XRP Ledger
14 Foundation; right?

15 A. Yes. It says -- okay. So it says, "If
16 your UNL does not have enough overlap with the UNLs
17 used by others" -- I'm just going to skip to the
18 line that you're concerned about. "As long as your
19 UNL has greater than 90 percent overlap with the one
20 used by people you are transacting with, you are
21 completely safe from forking."

22 Q. Greater than 90 percent is different from

1 identical to; right?

2 A. Greater than 90 percent is -- I would
3 interpret identical as being 100 percent.

4 Q. Okay. So you agree that that's different
5 from something that says greater than 90 percent?

6 A. I do agree with that.

7 Q. Okay. Stepping back for a second, what
8 methodology did you use to reach your opinion 1 on
9 page 31 that the XRP Ledger consensus protocol
10 requires validators to agree on a list of trusted
11 validators and that use of the list published by
12 Ripple Labs is a de facto requirement?

13 A. So the methodology I used was to understand
14 how XRP worked. I documented all of that in the
15 appendix C. And then I formed that opinion based on
16 what I read.

17 Q. And is there anything that prohibits
18 someone who is running a validator on the XRP Ledger
19 from deciding that they are willing to risk some
20 consistency or availability or forking and use a
21 lower degree of overlap than 90 percent?

22 A. Yes, there is.

1 Q. What's that?

2 A. So there is, you know, multiple things. I
3 guess the first reason would be that there is
4 absolutely no reason to do it. There is no benefit.
5 You're taking on risk for no benefit.

6 Q. Any other reasons?

7 A. Another reason is that there is a protocol
8 that was added recently called the negative UNL, if
9 I can point it out in my report.

10 So if we go to page 79, line 10. It
11 says -- I won't read the whole thing. But it --
12 maybe I'll just describe it. So if a validator is
13 nonresponsive, there is now an ability to remove
14 them from consensus. It requires 80 percent support
15 from other validators. So if this note is not on
16 your list, then you cannot contribute to this
17 protocol. And that's harmful to the rest of the
18 network.

19 We also have seen this protocol used in
20 real life. And we see that because validators --
21 because validators that are put on this list gain
22 80 percent support, it indicates that everyone has

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1 that particular validator on their list.

2 Q. And when you're talking about this list,
3 you're referring to the negative UNL?

4 A. No. I'm referring to -- I don't recall
5 what I referred to. So I'm sort of alternating
6 between what's called the dUNL and the nUNL. If you
7 want to read back, I can clarify.

8 Q. You just said validators that are put on
9 this list gain 80 percent support.

10 A. Yes. So I was referring to the nUNL.

11 (Reporter clarification.)

12 Q. What you wrote in your report is that --
13 well, first of all, when was the nUNL feature added?

14 A. So I don't see it in my report. I don't
15 recall off the top of my head. I know that it
16 was -- if I had to put an approximate time frame, I
17 would say probably in the last one to two years.

18 Q. Okay. So as best as you recall, the nUNL
19 was not a feature of the XRP Ledger in 2017, '18,
20 '19, for example?

21 A. I would be surprised to learn that it was
22 there in 2017.

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1 Q. Okay. What you wrote in your report is
2 that the nUNL relates to validators that are not
3 responsive. Do you think that forking or validating
4 different transactions is the same as being
5 nonresponsive?

6 A. So let's take those one at a time. I do
7 not believe that forking is the same as being
8 nonresponsive.

9 What was the second, something about
10 transactions?

11 Q. Validating different transactions than
12 other validators do.

13 MR. TAYLOR-COPELAND: Objection.

14 THE WITNESS: So I do not believe that
15 validating different transactions than others is the
16 same as being nonresponsive.

17 BY MR. OPPENHEIMER:

18 Q. So what makes you believe that if a
19 validator adopts a different UNL than other
20 validators, that that will result in getting placed
21 on the nUNL?

22 A. That's not an opinion that I have.

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1 Q. Okay. So you testified earlier that the
2 second reason why a validator would not adopt a list
3 with less than 90 percent overlap is the nUNL, but
4 now you're saying it is not because that validator
5 might get placed on the nUNL. So what about the
6 nUNL do you think prevents validators from adopting
7 lists with less than 90 percent overlap?

8 A. So if validators want to contribute to the
9 idea of an nUNL, then they must adopt the same dUNL.

10 Q. If they want to contribute to it?

11 A. Correct.

12 Q. Okay.

13 A. So this is an indication that they do use
14 the same validator list because they do contribute
15 to this protocol.

16 It's not about them being put on the list;
17 it's about them putting other people on the list.
18 That's where your confusion is.

19 Q. So a validator could choose to use less
20 than 90 percent overlap and could choose not to put
21 people on the nUNL; right?

22 A. A validator could choose to use less than

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1 90 percent against the recommendations of the
2 software. They're free to do that.

3 Q. Okay.

4 A. They're also free to participate in this
5 protocol. They could also modify their software to
6 not participate in this protocol. So again, this is
7 a recommendation to do. It's not -- there is no
8 forcing. You can't force anyone to do anything.
9 It's just a recommendation, a requirement.

10 Q. You just said it's a recommendation, a
11 requirement?

12 A. Yes. So a requirement to me would be if I
13 tell you to do something. It's a requirement.

14 Q. So you're saying it's a recommendation, not
15 a requirement?

16 A. I would say that a requirement --

17 MR. TAYLOR-COPELAND: Objection.

18 THE WITNESS: -- is maybe the same as a
19 recommendation or slightly stronger. So I was just
20 trying to strengthen -- upgrade it from a
21 recommendation to a requirement, because requirement
22 is the term that I use in the -- requirement is the

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1 term I used in the opinion itself.

2 BY MR. OPPENHEIMER:

3 Q. And you think that a requirement can be the
4 same as a recommendation in some circumstances?

5 A. No, I don't. What I'm saying is that what
6 I think is happening here is a requirement.

7 Q. You agree that nobody can force validators
8 to pick any particular UNL; right?

9 MR. TAYLOR-COPELAND: Objection.

10 THE WITNESS: Yes. So what I think happens
11 is that to the extent that you can require people to
12 use the recommended UNL, that's exhausted and you
13 can't go beyond. Like everything that you could do
14 to try and get people to use it has been done, but
15 at the end of the day, you can't say that someone is
16 forced to do it.

17 BY MR. OPPENHEIMER:

18 Q. Okay. So to take my question, you do agree
19 then that nobody can force validators to pick any
20 particular UNL; right?

21 MR. TAYLOR-COPELAND: Objection.

22 THE WITNESS: I mean, roughly correct.

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1 BY MR. OPPENHEIMER:

2 Q. How is it roughly correct?

3 A. So you started with "no one," so that means
4 that there is no circumstances under someone -- like
5 if I held a gun to your head and said use this
6 recommendation, then you could say that in this case
7 you were being forced to use it.

8 Q. Okay.

9 A. So there is no evidence that Ripple Labs is
10 forcing, under your definition of forcing, but you
11 can't say that no one never could do that.

12 Q. Okay. So putting aside criminal
13 intimidation and things like that, in the day-to-day
14 operation of an Internet-based distributed ledger
15 system, nobody can force another validator to adopt
16 a particular UNL; is that right?

17 A. Yes. That's reasonable.

18 MR. TAYLOR-COPELAND: Objection.

19 BY MR. OPPENHEIMER:

20 Q. Okay. Have you done any investigation to
21 figure out what lists of trusted validators any
22 particular real-world validator is using?

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1 A. Yes.

2 Q. What did you do?

3 A. So the first thing I did is I explored
4 whether it is possible to know. So I noted that in
5 the software there is a function that you can call
6 so notes will report their lists. This function is
7 marked requirement -- or sorry. This function is
8 marked private, which means that only the operator
9 of that note could run that function.

10 So, for example, I could rule out whether
11 I, sitting at Concordia, could just query all of
12 these validators and figure out what their lists
13 are. So that's not possible.

14 Q. So you didn't attempt to query individual
15 nodes to get their UNLs; correct?

16 A. Yes. I determined that that would not lead
17 anywhere, and so I stopped the investigation at that
18 point. So then I turned to indirect evidence. So
19 as outlined in my report in many places, not using
20 the same list will create artifacts. These
21 artifacts would be visible.

22 So artifacts would be, for example, the

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1 XRP Ledger stopping for a period of time. It could
2 be forks that aren't resolved. It could be failures
3 of people put on the negative UNL because there is
4 not enough support because these nodes do not
5 have -- these nonresponsive nodes on their list. So
6 there is no artifacts that I could find that would
7 suggest that people use different lists, so that's
8 one basis for it.

9 Another basis is that there is simply no
10 incentive to do it. So there is no -- I mean, there
11 is no benefit to it. There is only risks that you
12 take on.

13 Another point would be that it is against
14 the recommendations of the code. It's against the
15 recommendations of the XRP Ledger Foundation on
16 their website. So sitting here today those are
17 maybe four or five of my basis for thinking that.
18 There may be others that are contained in the
19 report.

20 Q. Do you know if the XRP Ledger has ever had
21 an outage in which it stopped working?

22 MR. TAYLOR-COPELAND: Objection.

1 THE WITNESS: So there is an incident that
2 I describe in my report. I don't know if you would
3 say it is -- it sort of depends, I guess, on your
4 definition of "stop working," but I can pull it out.

5 BY MR. OPPENHEIMER:

6 Q. Well, you just said you looked for
7 artifacts such as if the XRP Ledger stopped working.
8 What did you mean by that?

9 A. Yeah. So I didn't see anything that would
10 be consistent with the types of liveness failures
11 that we would see. So the incident I was referring
12 to is when the XRP Ledger lost the first couple -- I
13 forget the exact time period, but they lost the
14 first couple weeks, is my recollection, of ledger
15 entries at the very beginning of XRP.

16 Q. Okay.

17 A. So that's kind of a liveness failure. But
18 that was not the result of -- I would assume it's
19 not the response of people using different dUNLs
20 because there were only three nodes. All three
21 nodes were controlled by Ripple Labs. And the list
22 was provided by Ripple Labs so it doesn't make sense

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1 that they would disagree.

2 Q. So you're talking about an incident from
3 2012; is that right?

4 A. Yes. So let me -- I think -- if you
5 want --

6 Q. One question at a time.

7 A. Sorry. I thought your question was, are
8 you talking about an incident from 2012, but that's
9 not the question.

10 Q. That is the question, and I think you said
11 yes. And that's -- I want to ask the next question.

12 You're not aware of any liveness failures
13 on the XRP Ledger from 2013 to the present, are you?

14 A. I am not aware sitting here today.

15 Q. Okay. Are you aware of any forks on the
16 XRP Ledger from 2013 to the present?

17 A. I am not.

18 Q. And -- let's see. Okay. Where did you go
19 to look for evidence of whether there were liveness
20 failures or forks on the XRP Ledger?

21 A. So the evidence I consider in my report was
22 reading a lot of documents and like the resources

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1 and materials that were considered. I don't know if
2 I have a direct citation in the report. I don't
3 think I do. But it was certainly a point that was
4 discussed that these types of events had never
5 occurred.

6 Q. Okay.

7 A. It may be from Ripple Labs themselves that
8 made these assertions.

9 Q. Take a look at page 31 of your report. At
10 lines 23 to 24 you argue that "trust cannot be
11 smoothly transitioned away from Ripple Labs."

12 What methodology did you use to reach that
13 conclusion?

14 MR. TAYLOR-COPELAND: Objection.

15 THE WITNESS: So I tried to enumerate the
16 most reasonable cases by which that would happen.
17 So they're enumerated right below that sentence,
18 from 1 to 6. And then if you read through the list
19 and read the reasoning that I provide, then that's
20 the conclusion.

21 ///

22 BY MR. OPPENHEIMER:

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1 Q. Now, you suspect that today all of the
2 validators are using the list published by Ripple
3 Labs, but you don't know for certain whether that's
4 true. Is that fair to say?

5 A. So the sentence I say is on page 31,
6 line 21. "I suspect all validators use the Ripple
7 Labs' list verbatim and this is consistent with my
8 observations of the network."

9 Q. You suspect, but you don't know for
10 certain. Is that fair?

11 A. It's correct. So I have a basis for why I
12 suspect it and I think it's a reasonable
13 explanation. But is it theoretically hypothetically
14 possible that it's not true? Yes, it is
15 hypothetically possible.

16 Q. And you don't know as of today or any
17 historical date whether any individual validators
18 have made changes to the UNL that they've adopted;
19 right?

20 MR. TAYLOR-COPELAND: Objection.

21 THE WITNESS: So I have reason to believe
22 they have.

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1 BY MR. OPPENHEIMER:

2 Q. Okay. And --

3 A. Sorry. Actually, let me -- I just want to
4 make sure I understand. Let me just read what you
5 asked.

6 MR. TAYLOR-COPELAND: Ask him to restate
7 the question if you don't understand it.

8 THE WITNESS: No. I understood it. It's
9 just like the way you said it and what you meant
10 were probably different.

11 BY MR. OPPENHEIMER:

12 Q. I'll ask you the question again.

13 A. Okay.

14 Q. You don't know as of today or as of any
15 historical date whether any individual validators
16 have made changes to the UNL that they've adopted,
17 do you?

18 MR. TAYLOR-COPELAND: Objection.

19 THE WITNESS: So my belief is that when
20 Ripple Labs updates their list, everyone updates
21 their list. So they make changes.

22 BY MR. OPPENHEIMER:

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1 Q. And you believe that those changes are
2 driven by Ripple Labs updating its list?

3 A. That's correct.

4 Q. Hypothetically suppose the XRP Ledger
5 Foundation published a UNL that was identical to the
6 one published by Ripple. Would you be able to tell
7 in that case whether people are sourcing their UNL
8 from the XRP Ledger Foundation or from Ripple Labs?

9 A. So what you present as a hypothetical is
10 actually true. So there is a list that as of the
11 time of writing was published by that organization
12 and was identical to the Ripple Labs.

13 So the basis for people preferring the
14 Ripple Labs is because that's what the software will
15 do and it's what the recommendation of the software
16 is, is to not make changes. And so the default
17 behavior is still the same.

18 Q. That's not my question.

19 So I understand you've taken it out of
20 hypothetical and that's fine. Let's ask in real
21 terms.

22 A. Sure.

1 Q. Given that the XRP Ledger Foundation
2 publishes a UNL that's identical to the one
3 published by Ripple Labs, can you tell whether any
4 given validator is sourcing its UNL from the
5 XRP Ledger Foundation or from Ripple Labs?

6 A. Okay. So I mean, it's the same statement.
7 I suspect all validators use the Ripple Labs' list
8 verbatim. And so if you want to insert as opposed
9 to the other list, then it's the same. And it's the
10 exact same basis for why I think that's the case.

11 Q. If all of the -- hypothetically, if all of
12 the validators were using the XRP Ledger
13 Foundation's list, that would be consistent with not
14 seeing any forks or liveness failures or the other
15 factors that you listed earlier; right?

16 A. Okay. So that's yes. So the -- I gave
17 several basis for that assertion. And it's true
18 that some of them are specific and some of them are
19 not. And so the one that so requires is that
20 it's -- or the one that still applies in this
21 scenario is -- it's still the recommendation of the
22 software itself.

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1 Another basis I gave was that there is
2 absolutely no reason to do it. There is no benefit
3 to doing it, and so that also applies in this
4 scenario. The artifacts due to safety and liveness
5 and negative UNL would show up even in your
6 scenario.

7 Q. So you're assuming --

8 A. I'm sorry. I should say they would not
9 show up. So the artifacts would not show up.

10 Q. So you're assuming that validators would
11 continue to source their UNL from Ripple rather than
12 from the XRP Ledger Foundation, even though there is
13 no empirical way to determine which one they are
14 actually using; is that right?

15 MR. TAYLOR-COPELAND: Objection.

16 THE WITNESS: So I suspect that all
17 validators use the Ripple Labs' list.

18 BY MR. OPPENHEIMER:

19 Q. But from your position not having direct
20 insight or access to any of the validators, you
21 can't tell one way or the other if validators are
22 using the Ripple Labs' list or the XRP Ledger

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1 Foundation list; right?

2 A. So you would -- I mean, everything is based
3 on a reasonable explanation. Right? And so there
4 is always hypotheticals where things aren't what's
5 the most probable. So the most probable is that
6 people do not make -- like what you're suggesting
7 requires you to go against the recommendation of the
8 rippled source code, actually go into a file that
9 tells you not to change it, and make that change.
10 Right?

11 And so no, I don't think it's reasonable
12 that everyone is doing that and no one is even
13 talking about the fact that they're doing that, but
14 I can't rule it out as a possibility.

15 Q. You agree that the source code points users
16 to the XRP Ledger Foundation as a source where they
17 can obtain a dUNL; right?

18 A. As a backup source.

19 Q. You agree that the code tells users that
20 the XRP Ledger Foundation publishes a dUNL; right?

21 MR. TAYLOR-COPELAND: Objection.

22 THE WITNESS: Yes. So I agree that the

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1 link to the dUNL from the XRP Ledger Foundation is
2 included in the software.

3 BY MR. OPPENHEIMER:

4 Q. And you said only as a backup. What do you
5 mean by that?

6 A. So what I mean by that is that the default
7 behavior is that Ripple -- or sorry -- rippled, the
8 software, will obtain the list from Ripple Labs.

9 Q. Did you test the software to see if that's
10 true?

11 A. You mean -- yes. So no, I did not.

12 So the basis of it is by looking at the
13 code. Also the testimony that other people gave
14 when they talked about this. In the deposition it
15 was -- you know, I think David Schwartz covers it in
16 his deposition, for example, sitting here today I
17 recall. So I didn't feel the need to run it to test
18 it. I just went with what people said.

19 Q. And to be clear, you could have run your
20 own instance of the rippled software on your own
21 machines if you wanted to; right?

22 A. Yes. So it's possible to run rippled on

1 machines that I own.

2 Q. You didn't do that, though; correct?

3 A. No, I didn't.

4 Q. Okay. Now, turning back to page 7 at

5 line 12 through 14, what you wrote there is "The

6 consensus mechanism is responsible for validating

7 transactions resolving potential conflicts, and

8 ensuring that all validators within the system agree

9 on the order and legitimacy of transactions."

10 What does "legitimacy" mean as you used it

11 in that sentence?

12 A. So I can give you an example. So, for

13 example, if I sent you five XRP, but my account

14 balance only had two XRP, then that would be

15 considered an invalid transaction.

16 Another example I can give you is as the

17 owner of that XRP, I need to provide a digital

18 signature. And so let's say I provided a digital

19 signature that was wrong or I signed the wrong

20 thing, that would be another example of an invalid

21 transaction.

22 Q. Is there ever any scenario where validators

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1 running rippled software would approve a transaction
2 that's not legitimate as you've defined it?

3 MR. TAYLOR-COPELAND: Objection.

4 THE WITNESS: I think it's possible.

5 BY MR. OPPENHEIMER:

6 Q. Under what circumstances?

7 A. So without enumerating every circumstance,
8 an easy circumstance would be that the validators --
9 a majority -- or as defined as a quorum, which is
10 over 80 percent, the validators would be malicious.
11 Malicious being that they aren't following the rules
12 of the protocol.

13 Q. Okay. So I had asked -- and I'll sharpen
14 this question.

15 A. Yes.

16 Q. Is there ever any scenario where what we
17 can call an honest validator, a non-malicious
18 validator that's running rippled software, the
19 actual software that you can get off of GitHub
20 without alteration, would approve a transaction that
21 is not legitimate as you have defined the term
22 legitimate?

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1 MR. TAYLOR-COPELAND: Objection.

2 THE WITNESS: So assuming that there is no
3 problem with the software or bug in the software,
4 then that seems reasonable.

5 BY MR. OPPENHEIMER:

6 Q. Okay. Now, getting rid of the constraint
7 that I just put on of having an honest and
8 non-malicious validator, are there any scenarios
9 other than the one you already mentioned where
10 80 percent of validators are malicious in which
11 validators would approve a transaction that is not
12 legitimate as you've defined the term?

13 A. So first off, I don't feel that I did
14 define what legitimate means, but I gave two
15 examples of what it meant.

16 Q. In that case can you please define it?

17 A. I would say that it is legitimate according
18 to the protocol itself. The protocol is in the
19 software. So the software defines -- it will have a
20 definition of what's considered legitimate or not.
21 And so anyone running the software, and if the
22 software correctly implements the rules, then they

1 will -- then they won't vote in favor of an

2 illegitimate transaction for approval.

3 Q. So illegitimate transactions won't be

4 approved unless there is a supermajority of

5 malicious validators; is that right?

6 A. So that's a -- so a supermajority of

7 malicious validators is a sufficient condition for

8 the potential of an invalid transaction being

9 approved.

10 Q. Is there any other sufficient condition?

11 A. So errors in software is another one that

12 isn't just theoretical.

13 Q. Is there any real example of an error in

14 the rippled software that has led to invalid

15 transactions being approved?

16 A. Sitting here today I don't know of any.

17 Q. Okay.

18 A. And I believe I've read in the disclosure

19 to the contrary that there have not been.

20 Q. Okay. And any other sufficient conditions?

21 To make the question complete here, are

22 there any other conditions that would be sufficient

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1 to have illegitimate transactions approved?

2 A. So the only other thing would be that there
3 is some misunderstanding of the consensus. So when
4 you say supermajority, that's based on some
5 mathematical analysis. Those models don't always
6 capture every possibility. We've actually seen it.

7 For example, in my report, you can look
8 at -- let's see -- page 76. And it goes through
9 kind of the literature and how these bounds changed
10 over time. It could be that the number that people
11 are throwing around is just not right because they
12 didn't think of something.

13 So I would say that those are definitely
14 the three primary ways: Software errors, malicious
15 actors, or some consensus -- some problem with the
16 analysis of the consensus.

17 Q. Sitting here today are you aware of any
18 other conditions that would suffice?

19 A. No.

20 MR. OPPENHEIMER: Okay. Want to take a
21 break for lunch?

22 MR. TAYLOR-COPELAND: Sure.

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1 THE VIDEOGRAPHER: Off the record,

2 12:32 p.m.

3 (Recess, 12:32 p.m. to 12:44 p.m.)

4 THE VIDEOGRAPHER: This begins media file
5 number 4, today's testimony of Jeremy Clark. We're
6 back on the record at 12:44 p.m.

7 BY MR. OPPENHEIMER:

8 Q. If I can turn your attention to page 33 of
9 your report. The second opinion that you've offered
10 in this report, starting at line 13, you wrote "The
11 XRP Ledger is a distributed system but Ripple Labs
12 remains the root of trust."

13 The first question: What methodology did
14 you follow to determine whether Ripple Labs is the
15 root of trust?

16 A. So I would say the methodology I used is
17 the same as everything else. I read everything I
18 could about the XRP Ledger, how it works. And then
19 going through all that material, combined with my
20 knowledge of how Bitcoin and Ethereum worked, I
21 identified this as a difference, like core
22 difference between XRP Ledger and then Bitcoin and

1 Ethereum together.

2 Q. What do you mean when you say "root of
3 trust" here?

4 A. Okay. So this is, I think, answered pretty
5 well in the report itself. So just going down to
6 line 19, it says, "During this time period all
7 validators on the recommended validator list could
8 have been vulnerable to the compromise of a single
9 entity."

10 So that's what I would call the root of
11 trust. I note that there is inconsistent
12 terminology in the academic literature, but root of
13 trust, trust anchor, single point of failure are all
14 more or less the same terms.

15 Q. So having all -- sorry.

16 Having all validators vulnerable to the
17 compromise of a single entity is what makes an
18 entity a root of trust?

19 A. It's a sufficient condition.

20 Q. Okay. You didn't cite any publications
21 here for that definition, do you?

22 A. So if your question is does line 21 have

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1 any citations, the answer is no.

2 Q. Well, is there any source that you cite in
3 your report that provides that definition you just
4 gave?

5 A. So probably.

6 Q. Probably? You're not sure?

7 A. So I mean, these are standard -- okay. So
8 let me rephrase again.

9 So I say insecurity, meaning in my field,
10 this is what they're called. So this is -- the
11 basis of this is my knowledge of my field. My CV,
12 which includes a lot of publications, would use
13 these terms. Are they in appendix D or in my
14 references? I wouldn't know. I'd have to go
15 through the citations one by one, but I wasn't
16 intending to cite a specific paper for it. It was
17 more of a general statement based on my knowledge of
18 the field.

19 Q. Okay. And you don't cite any publications
20 that offer a particular methodology for how to
21 determine when an entity is a root of trust; right?

22 A. Okay. So you're asking what's the

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1 methodology for determining, or once you see one are
2 you saying -- how do you decide yes or no?

3 Q. Do you cite any publications that offer a
4 particular methodology for how to determine whether
5 an entity is a root of trust?

6 A. It's possible. Again, it's the same
7 answer. So there is no citation on this line. It's
8 something that I know from my general knowledge and
9 there is not a specific citation, but the citations
10 may cover -- may or may not cover that.

11 Q. Okay. So your opinion is that from
12 January 2013 to June 2018, Ripple Labs was the root
13 of trust because all of the validators on the
14 recommended validator list were controlled by Ripple
15 Labs; is that right?

16 A. No, that's not right.

17 Q. Why was -- why do you reach the conclusion
18 that Ripple Labs was the root of trust between
19 January 2013 and June 2018?

20 A. So it's -- the answer is in the next
21 paragraph, starting on line 23. So -- well, I deal
22 with the situation even after diversifying. So even

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1 after this time period Ripple Labs continues to be a
2 root of trust. So that is meant to be inclusive
3 both of that period and today.

4 Q. Okay. So let's take it one piece at a
5 time. I want to start with the January 2013 to
6 June 2018 time period.

7 A. Correct.

8 Q. In that time period, your opinion is that
9 Ripple Labs was the root of trust because it
10 controlled all of the validators on the recommended
11 validator list; is that right?

12 A. That's not right.

13 Q. Why did you reach that conclusion for the
14 period January 2013 to June 2018?

15 A. For the same reason that I reached the
16 conclusion for the entire time period.

17 Q. What is that reason?

18 A. So it's because Ripple Labs controls the
19 list. So it's what -- basically what I'm saying
20 here is there was this time period, so you might
21 think it is obvious that they're the root of trust.
22 But even beyond this, there is something else that's

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1 the real reason.

2 Q. So the real reason why you think Ripple
3 Labs is the root of trust is that it controls the
4 unique node list; is that right?

5 A. I don't accept the real reason. I mean,
6 this is also a sufficient reason. So let me phrase
7 it this way.

8 From January 2013 to June 2018, there were
9 two reasons why Ripple Labs was the root of trust.
10 One of those reasons was because they were the only
11 entity on the list. The second reason was because
12 they controlled the list. After that there
13 continued to only be one reason, so the one reason
14 went away but the other one continued.

15 Q. Got it. Thank you.

16 Now, you agree that Ripple Labs has only a
17 single validator on the recommended validator list
18 now; right?

19 A. At the time I wrote my report, I looked --
20 and so as of right today, I don't know, but at the
21 time of the report that was my understanding.

22 Q. As of the date of your report, there was

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1 only one Ripple Labs validator out of 35 on the
2 recommended list; right?

3 A. That's my understanding, yes.

4 Q. And we saw earlier the XRP Ledger
5 Foundation's statement that you're completely safe
6 if you have more than 90 percent overlap on the
7 validator list.

8 Do you agree that if someone were to remove
9 the one Ripple validator that they would still have
10 more than 90 percent overlap with the remainder of
11 the list?

12 A. Yes. So I agree that that 35 minus 1 is
13 greater than that. I agree. I accept that.

14 Q. Now, the -- let's see. Are you familiar
15 with an entity called Coil?

16 A. So in my disclosure -- sorry. In reading
17 all the materials in preparing my expert report, I
18 did encounter references to the company Coil.

19 Q. Are you aware that Coil also previously
20 published a default unique node list?

21 A. So just give me a second to consult my
22 report.

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1 MR. TAYLOR-COPELAND: Objection.

2 THE WITNESS: Okay. So if you refer to
3 page 80, line 10 -- actually let's do line 11.

4 I make reference to what you're talking
5 about, and so yes.

6 ///

7 BY MR. OPPENHEIMER:

8 Q. You're not offering an opinion that Ripple
9 Labs controlled the content of Coil's UNL, did
10 you -- are you?

11 MR. TAYLOR-COPELAND: Objection. Calls for
12 speculation.

13 THE WITNESS: So I have no idea what people
14 at Coil were thinking when they constructed their
15 list.

16 BY MR. OPPENHEIMER:

17 Q. Right. And you're not -- in this report
18 here you're not saying that Ripple Labs was in
19 control of Coil's list; correct?

20 MR. TAYLOR-COPELAND: Same objection.

21 THE WITNESS: It would define how you mean
22 "in control." So the same reasons why everyone

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1 would want to run the default list and not deviate
2 it from those incentives would still apply to Coil.
3 So if Coil came up with a list that was
4 completely -- well, not completely different, but
5 substantially different from XRP, then that would
6 create turmoil in the network. It could create
7 liveness and safety falls.

8 BY MR. OPPENHEIMER:

9 Q. Do you know if Coil's list was different
10 from Ripple Labs' list?

11 A. So sitting here today I don't recall
12 whether it was or not.

13 Q. Okay. We talked earlier a little bit about
14 the list published by the XRP Ledger Foundation.
15 Are you offering an opinion that Ripple controls the
16 contents of the XRP Ledger Foundation's UNL?

17 MR. TAYLOR-COPELAND: Objection. Calls for
18 speculation.

19 THE WITNESS: Okay. So the opinion on my
20 report is just based on the simple observation that
21 the lists are the same. The process by which these
22 lists are constructed was covered in -- I read some

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1 disclosure that discussed the relationship between
2 them and sort of how they decide. And my takeaway
3 from that was that there is coordination between the
4 two in terms of the list.

5 And so it's quite reasonable to expect that
6 they would continue to be the exact same list. And
7 that's because of direct coordination between the
8 people at the foundation and people at Ripple Labs.

9 Now, your question was whether Ripple Labs
10 is forcing them. And I certainly haven't read
11 anything that would suggest that they were forcing
12 them to use the same list.

13 BY MR. OPPENHEIMER:

14 Q. To be clear, my question was whether you're
15 offering an opinion that Ripple Labs controls the
16 contents of the XRP Ledger Foundation's list.

17 A. So again --

18 MR. TAYLOR-COPELAND: Same objection.

19 THE WITNESS: So the influence on this
20 organization is set by a set of circumstances which
21 is partly in Ripple Labs' control. So there might
22 be indirect ways, but it's not a direct control.

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1 BY MR. OPPENHEIMER:

2 Q. So your view is that Ripple Labs indirectly
3 influences the XRP Ledger Foundation by essentially
4 having the XRP Ledger Foundation need to change its
5 own UNL in order to match the Ripple Labs' UNL; is
6 that right?

7 MR. TAYLOR-COPELAND: Same objection.

8 THE WITNESS: Sorry. I'm just going to
9 read your question instead of asking you to repeat
10 it, now that I know I can do that.

11 Yeah. So I would say that there are
12 incentives for the XRP Ledger Foundation to change
13 its lists to match Ripple Labs' list if Ripple Labs
14 changed it.

15 ///

16 BY MR. OPPENHEIMER:

17 Q. And do you believe that that's what's
18 happening in practice?

19 A. No, I don't. I believe it's the opposite.

20 Q. So your understanding is that the
21 XRP Ledger Foundation changes its list and then
22 Ripple Labs makes changes to its own list to match

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1 that?

2 MR. TAYLOR-COPELAND: Objection.

3 THE WITNESS: That's a possible
4 explanation. It's a plausible explanation.

5 BY MR. OPPENHEIMER:

6 Q. Do you know if that is, in fact, what is
7 happening in the real world?

8 A. So sitting here today I just know at a high
9 level -- I can recall a discussion of this point
10 that was in one of the depositions. And I'm not
11 100 percent confident which way it goes sitting here
12 today.

13 Q. Do you believe that if the XRP Ledger
14 Foundation is making changes to its own list at will
15 and then Ripple Labs is updating its own list to
16 match, that that means Ripple Labs controls the
17 contents of the UNL?

18 MR. TAYLOR-COPELAND: Objection. Calls for
19 speculation.

20 THE WITNESS: So Ripple Labs is free to
21 make that decision or not. So there is no control
22 there that I can see. It's still in complete

1 control of its own list.

2 BY MR. OPPENHEIMER:

3 Q. But it is not in complete control of the
4 XRP Ledger Foundation's list; is that right?

5 A. It controls --

6 MR. TAYLOR-COPELAND: Objection. Calls for
7 speculation.

8 THE WITNESS: It controls whether the list
9 is included in rippled or not. So it can remove
10 that list at any time, but it is not in direct
11 control of the content of that list. It is only in
12 control of whether that list is included or not.

13 BY MR. OPPENHEIMER:

14 Q. You agree that the XRP Ledger Foundation's
15 list is included in the rippled software; right?

16 A. I agree that at the time I wrote the
17 report, it is included as a backup.

18 Q. And you also agree that Ripple Labs doesn't
19 dictate which validators appear on that list; right?

20 A. So I couldn't say one way or another. Sort
21 of calls for speculation.

22 Q. Okay. And your --

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1 A. But certainly -- if you run the other
2 example of, let's say, they just started changing
3 the list and it was completely different, that would
4 create problems for the XRP Ledger. Right? So
5 that's what I'm saying. It's just that if they
6 changed it at will, it could create problems.

7 Q. And would it still be your opinion that
8 Ripple Labs controls the list if the XRP Ledger
9 Foundation was changing the list at will and Ripple
10 was just mirroring it?

11 MR. TAYLOR-COPELAND: Objection.

12 THE WITNESS: Again, they still control
13 whether the list -- so it's a question of
14 delegation. So they've delegated a responsibility
15 to another organization, but they chose to make that
16 delegation. They can revoke that delegation at any
17 time, therefore, they're still ultimately in
18 control.

19 BY MR. OPPENHEIMER:

20 Q. The XRP Ledger code is available on GitHub;
21 right?

22 A. Yes, it is. So the rippled software is

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1 available.

2 (Reporter clarification.)

3 Q. You could go on GitHub today and propose
4 removing the Ripple Lab's UNL from the code,
5 couldn't you?

6 MR. TAYLOR-COPELAND: Objection.

7 THE WITNESS: Yes. So I could remove it
8 myself, and then I could propose a pull request that
9 Ripple -- or whoever is in control of the repository
10 would pull that.

11 BY MR. OPPENHEIMER:

12 Q. In fact, anyone who knows how to use GitHub
13 could do that; right?

14 A. Anyone that knows how to use GitHub can do
15 that.

16 Q. And do you know who is in control of that
17 repository?

18 A. At the time of writing the reports, yes.
19 So sitting here today I certainly don't know names.
20 I think it was a question that was asked of them and
21 it's in -- I know where the answer is, but I don't
22 know what the answer is. I can point you to the

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1 document.

2 Q. Do you know if the XRP Ledger Foundation is
3 in control of the repository?

4 A. As of the time of writing the report, it
5 was branded that way. So the sort of parent
6 directory. That would indicate to me that they were
7 in control.

8 Q. So assume for a moment that the XRP Ledger
9 Foundation is in control of the GitHub repository.
10 It can decide whether to remove the Ripple Labs'
11 list from the rippled code or keep it there. And it
12 can also choose whether it is going to make changes
13 to its own list that Ripple can choose whether or
14 not to mirror. Under those facts is it still your
15 opinion that Ripple Labs controls the dUNL?

16 MR. TAYLOR-COPELAND: Objection.

17 THE WITNESS: So my opinion is that Ripple
18 Labs controls its dUNL. It is the default option.
19 The people that control the repository for it can
20 remove that recommendation cite at will. And my
21 understanding is that the people that control the
22 repository as of today is the XRPL Foundation.

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1 BY MR. OPPENHEIMER:

2 Q. Do you know -- let me ask this: Are you
3 offering an opinion that Ripple Labs controls the
4 rippled software?

5 A. So I just have general information about
6 it. So I understand that they originally -- so
7 "controls" is a weird word, but let's just define
8 that as being they have the commit piece for the
9 repository.

10 So my understanding is that they were in
11 control for a certain period of time. After a
12 certain period of time, they transferred control to
13 this XRPL Foundation. I don't know the exact
14 relationship between these companies, foundations.

15 Q. Are you offering an opinion in this case
16 that Ripple Labs is a root of trust for the rippled
17 software?

18 A. I'm sorry. I don't have that information
19 sitting here today. It would depend on who controls
20 the repository. So just because it's branded a
21 certain way, that doesn't -- that's not an
22 indication of actually who controls it. You would

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1 have to look and see who has those authorities,
2 whether they're employees of Ripple Labs or not.

3 Q. So you're not sure one way or the other,
4 but it's certainly not one of the opinions that
5 you're offering in your report then?

6 A. So part of -- I mean, the opinion -- okay.
7 So one thing that's in my report certainly is there
8 were periods of time where Ripple Labs were those
9 people. The exact makeup of who has those commit
10 keys today, I'm not sure.

11 Q. Do you believe that Ripple has veto power
12 over potential changes to the rippled code?

13 MR. TAYLOR-COPELAND: Objection.

14 THE WITNESS: I suppose there is two ways a
15 veto might take place. So one would be by not
16 approving pull requests. So that would go to the
17 question of who has those keys and whether they are
18 employed there. And then there would be a softer
19 form of veto, like through their political
20 relationships. I'm not opining on that.

21 BY MR. OPPENHEIMER:

22 Q. You're not offering an opinion one way or

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1 the other on that?

2 A. I'm not offering an opinion one way or
3 another on that.

4 Q. At page 34, lines 5 through 8, you write,
5 "Ripple Labs is a single point of failure for the
6 system. An attack (insider or external) directly on
7 Ripple Labs or its cryptographic signing key
8 (hardcoded as a verification key into rippled) could
9 lead to a catastrophic protocol failure that would
10 require human intervention to repair."

11 Is that statement accurate as of the date
12 you wrote this opinion?

13 A. To the best of my knowledge, it is.

14 Q. What do you mean by "compromise" when you
15 say it in that sentence?

16 A. I don't think I used the word "compromise."

17 Q. I'm sorry. What do you mean by
18 "catastrophic" when you say it in that sentence?

19 A. So catastrophic, I mean that the protocol
20 could not repair itself.

21 Q. Are you aware of any examples of this
22 actually happening to Ripple?

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1 A. Not to Ripple, no, I'm not.

2 Q. How did you figure out what would happen if
3 Ripple's cryptographic signing key were compromised?

4 A. So I came to understand what that key is
5 used for. And if it were compromised, meaning
6 someone else had a copy of it, they breached the
7 server, then I understood what they could do with
8 that key.

9 Q. And what is that key used for?

10 A. So it's used to sign the recommended
11 validator list.

12 Q. If there were a problem with Ripple's
13 recommended validator list, wouldn't XRP Ledger
14 users be able to adopt the backup list from the
15 XRP Ledger Foundation?

16 A. So this --

17 MR. TAYLOR-COPELAND: Objection.

18 THE WITNESS: -- I think asked and
19 answered. But again, would the software do it by
20 default? No, because it still remains the default
21 situation.

22 Is there a hypothetical scenario where all

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1 users go in and change that file? Then yes. That's
2 theoretically possible. But the default behavior
3 would be that you would continue to use this
4 compromise list.

5 BY MR. OPPENHEIMER:

6 Q. At page 28, line 6 to 7, you write that
7 Ripple could modify its recommended validator list
8 to overtake the network. What does "overtake the
9 network" mean there?

10 A. Can you give me the line number again?

11 Q. Yeah. Lines 6 through 7 on page 28.

12 A. So I think what I meant was just that they
13 could control what updates are made to the ledger
14 fully.

15 Q. If people disagreed with changes that
16 Ripple wanted to make in this hypothetical you've
17 offered, wouldn't they be able to change their
18 recommended validator list in order to reject it?

19 MR. TAYLOR-COPELAND: Objection.

20 THE WITNESS: So the short answer is yes.

21 And the sentence that you asked the
22 previous question about that mentioned the

1 catastrophic failure was meant to dictate that
2 scenario that it would require human invention. So
3 everyone changing their list is what I mean -- or
4 it's one of the things that I mean by human
5 intervention.

6 BY MR. OPPENHEIMER:

7 Q. Okay. Now farther down on page 28,
8 lines 12 to 14, you write, "Ripple Labs will
9 continue to play this role until Ripple Labs itself
10 decides to delegate it to someone else (e.g.,
11 XRP Ledger Foundation)."

12 A. Sorry. What page?

13 Q. Page 28, lines 12 to 14.

14 Did you believe at the time you wrote this
15 report that Ripple Labs was currently playing the
16 role you described?

17 A. So by this role, I mean that they are the
18 list of validators. And yes, they do -- they do
19 play that role.

20 Q. Hypothetically assume the XRP Ledger
21 Foundation controls the GitHub code repository.
22 Wouldn't the XRP Ledger Foundation be able to remove

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1 Ripple Labs from this role by changing the dUNL in
2 the rippled code without Ripple's approval or
3 consent?

4 MR. TAYLOR-COPELAND: Objection.

5 THE WITNESS: Okay. So in this scenario,
6 basically whoever controls the commit keys for this
7 repository would be -- they would be able to make
8 that change. And then every instance of rippled
9 would now use the change code. Rippled. Sorry.

10 BY MR. OPPENHEIMER:

11 Q. And so in that case it would not require
12 Ripple Labs itself to decide to delegate its role.
13 That could be done by whoever owns the commit keys;
14 right?

15 A. Sorry. Let me just read it again.

16 MR. TAYLOR-COPELAND: Objection.

17 THE WITNESS: So I suppose I'm thinking of
18 them as the same thing. So meaning that -- okay.
19 So I guess there is two ways that this delegation
20 could happen. So one is by transferring control
21 over the software and the second would be removing
22 themselves from the file, but that can only be done

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1 through control of the software anyway. So maybe
2 they're the same in the end.

3 BY MR. OPPENHEIMER:

4 Q. And let's see. If somebody wanted to make
5 changes to the software today and Ripple Labs
6 disagreed and didn't want that change to happen, is
7 Ripple Labs able to prevent that change from
8 occurring?

9 MR. TAYLOR-COPELAND: Objection.

10 THE WITNESS: So sitting here today I don't
11 know the answer. It again goes to who controls the
12 keys.

13 MR. OPPENHEIMER: Okay. Why don't we take
14 our break here.

15 THE WITNESS: Okay.

16 THE VIDEOGRAPHER: Off the record,

17 1:13 p.m.

18 (Lunch recess, 1:14 p.m.)

19

20

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SAN DIEGO, CALIFORNIA

9

FRIDAY, OCTOBER 20, 2023, 2:05 P.M.

10

11

THE VIDEOGRAPHER: This is the beginning of

12

media file number 5 in the testimony of Jeremy

13

Clark. We're back on the record. The time is

14

2:05 p.m.

15

BY MR. OPPENHEIMER:

16

Q. I'd like to direct you back into your

17

expert report, Exhibit 159 to page 35. And in

18

particular I'd like to focus you on the heading at

19

the top for opinion 3 where you write "Ripple Labs

20

is a gatekeeper to full participation."

21

Do you see that?

22

A. I do see it.

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1 Q. What do you mean by "full participation"?

2 A. Let's say, for example, I decided I want
3 to be a validator so I download the software
4 rippled. I fire it up. So I start processing
5 transactions, but nobody else is listening to me so
6 I am not meaningfully contributing to consensus. So
7 I would say that that's a sort of partial
8 participation. I'm doing stuff, but I'm not fully
9 participating.

10 This is in contrast to, say, something like
11 Bitcoin or Ethereum where, when I fire up my
12 validator, then I can meaningfully contribute fully.
13 There is no limitation on what I can or cannot do.

14 Q. So full participation depends on whether
15 you're meaningfully contributing to consensus; is
16 that right?

17 A. That's right.

18 Q. So whether someone fully -- is fully
19 participating in the blockchain, that doesn't turn
20 on whether they can propose transactions; right?

21 A. Yes, that's correct.

22 Q. And in your view whether someone is

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1 participating fully doesn't turn on whether they can
2 propose amendments to the source code?

3 A. So these would be like necessary conditions
4 for full participation, but not sufficient.

5 Q. Okay. You agree that someone who just
6 fires up a new validator on the XRP Ledger protocol
7 can propose amendments to the source code; right?

8 MR. TAYLOR-COPELAND: Objection.

9 THE WITNESS: So anybody, including people
10 who fire up validators, can propose amendments to
11 the -- or submit code changes -- suggest code
12 changes to the source code.

13 ///

14 BY MR. OPPENHEIMER:

15 Q. And anyone including someone who just fires
16 up a new validator can propose transactions on the
17 XRP Ledger; right?

18 A. Yes. That's correct.

19 Q. And someone who fires up a new validator
20 can still vote on and sign off on new ledgers;
21 right?

22 A. I wouldn't say that that's true.

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1 Q. Well, regardless of whether other
2 validators are considering their votes, they can
3 still sign off and say I agree with this ledger;
4 right?

5 A. So the -- so you asked about voting and
6 signing. So I agree that on the signing side, they
7 could do it. On the voting side -- I mean, there
8 isn't an explicit vote, but they're not contributing
9 to the vote. So like sort of as an analogy, if you
10 want to use the voting as an analogy, they aren't
11 voting.

12 Q. Let's turn to Bitcoin for a minute.

13 Suppose somebody starts a new Bitcoin
14 miner, but they don't have enough computing power to
15 solve the next problem first and so this new miner
16 never writes the next block in the Bitcoin
17 blockchain. Would you still consider that full
18 participation?

19 MR. TAYLOR-COPELAND: Objection.

20 THE WITNESS: I don't accept the premise
21 that they don't have enough computational power to
22 solve the next block. I think everyone that joins

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1 Bitcoin has that. Any amount of computation at
2 some level of probability, you can solve the next
3 block. It's super low probability, but it's not
4 impossible.

5 BY MR. OPPENHEIMER:

6 Q. If you try to run a Bitcoin miner on an
7 ordinary laptop --

8 A. Yes.

9 Q. -- without specialized graphics cards or
10 other software and hardware specifically designed
11 for Bitcoin mining, and that is the extent of your
12 computing power, the probability that you will be
13 able to solve the next block is asymptotic to zero,
14 isn't it?

15 A. So phrase it differently, it's nonzero as
16 opposed to XRP Ledger where it would be actually
17 zero.

18 Q. And so your view is that as long as there
19 is any chance, no matter how slim, as long as it is
20 not zero, as long as there is any chance that a new
21 miner could write the next block, that's full
22 participation?

1 A. That's right. And so there is no
2 gatekeeper to full participation.

3 Q. And what did you do to figure out that the
4 odds of a newly launched validator on the XRP Ledger
5 getting added to a recommended validator list are
6 exactly zero as opposed to extremely close to zero?

7 A. So the statement I was making is that
8 assuming you are not on the list, your probability
9 is zero. I wasn't incorporating the probability
10 that you would be added to the list. So again,
11 whether you're on the list or not is Ripple Labs
12 serving that gatekeeper role.

13 Q. So it is theoretically possible that
14 somebody could launch a new validator and Ripple
15 Labs or someone else maintaining a UNL could see
16 that the new validator has launched and immediately
17 add that to their list; right?

18 A. So Ripple Labs is free to add any validator
19 they want to their list, including a validator that
20 someone fired up.

21 Q. And the XRP Ledger Foundation is also free
22 to do that; right?

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1 A. That's correct.

2 Q. And when Coil was publishing its list, Coil
3 was free to do that; right?

4 A. That's correct.

5 Q. Let's talk about Ethereum for a minute.

6 If a new Ethereum miner doesn't already own
7 Ethereum, then isn't it true that they've got no
8 ability to participate in the proof of stake
9 consensus process?

10 A. That's correct. You require -- it requires
11 owning ETH in order to participate in the proof of
12 stake consensus mechanism.

13 Q. So someone can't just fire up a new
14 Ethereum miner, they also have to buy some ETH; is
15 that right?

16 A. It goes beyond that, but yes. Those are
17 conditions, necessary conditions.

18 Q. Those are both necessary?

19 A. Yes.

20 Q. Okay. And you argue in this section that a
21 new validator would need a preexisting relationship
22 with Ripple Labs in order to make it onto the

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1 recommended validator list; is that right?

2 A. So the sentence reads, "A new validator
3 without a preexisting relationship with Ripple Labs
4 that joins the XRP Ledger network for the first time
5 will presumably not yet be on the recommended
6 validator list."

7 So I don't think that's saying exactly how
8 you phrased it, but...

9 Q. Okay. So your presumption is that without
10 a preexisting relationship with Ripple Labs,
11 validators can't make it on to the recommended
12 validator list. Is that a fair summary?

13 A. No. I wouldn't say that. I would say
14 that -- I would say it as it says for the first
15 time. So it's not that they won't eventually be
16 added on the list or that there isn't some
17 possibility of that. It's just that if they fire up
18 a validator and Ripple Labs has never heard of them,
19 then they aren't going to be on the list.

20 Q. I see. So you're referencing here the
21 first time that a new validator shows up on the
22 network?

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1 A. That's correct.

2 Q. Okay. Do you think that a preexisting
3 relationship with Ripple Labs is necessary for a
4 first-time validator to get on the recommended
5 validator list maintained by the XRP Ledger
6 Foundation?

7 MR. TAYLOR-COPELAND: Objection.

8 THE WITNESS: So I don't know why they add
9 people or not add people to the list, "they" being
10 the XRP Ledger Foundation.

11 BY MR. OPPENHEIMER:

12 Q. Did you do anything to figure out why they
13 add or don't add people to the list?

14 A. I did.

15 Q. What did you do?

16 A. So I read some depositions of people that
17 work at Ripple Labs that discussed it.

18 Q. Anything else?

19 A. That's it. No.

20 Q. Okay. So you didn't look at documentation
21 published by the XRP Ledger Foundation itself?

22 A. I did look at documentation published by

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1 the XRP Ledger Foundation in the report. It's cited
2 extensively through the report.

3 Q. But not for this purpose?

4 A. For this purpose being specifically what
5 the thought process is behind whether or not you
6 could be added to the recommended validator list.

7 So vaguely I recall that there is some
8 necessary conditions, like up time and things like
9 that. So my recollection from everything I read,
10 which would include these documents. So if your
11 question is just whether I looked at those, I think
12 I read them in that documentation.

13 Q. Okay. So I just want to make sure I
14 covered everything that you did to figure it out.

15 Is there anything else that you did to
16 figure out what criteria the XRP Ledger Foundation
17 uses to add validators to its list?

18 A. No. So beyond the deposition and beyond
19 whatever they publicly state on their website, I
20 don't.

21 Q. Okay. Now further down on the same page,
22 35, at line 24, you write opinion 4, "XRP

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1 distribution favors Ripple Labs."

2 Can you explain what you mean by that?

3 A. So XRP, as we know, is the digital asset,
4 and all digital assets require an initial
5 allocation. So they come from somewhere and they go
6 to some person. And so what I do in this section is
7 I just outline, in the case of XRP Ledger, how that
8 initial allocation was. And then -- I mean, the
9 report -- or sorry -- the opinion is basically
10 summarized in the sentence 11 on page 36, which
11 says, "It is reported that 80 billion units were
12 allocated to Ripple Labs."

13 Q. What does it mean for a distribution to
14 favor one particular entity?

15 A. So it means that they were included while
16 others were not.

17 Q. So whether a distribution favors an entity
18 is asking whether that entity is getting part of the
19 distribution, that's your framework?

20 MR. TAYLOR-COPELAND: Objection.

21 THE WITNESS: Yeah. So let's say that they
22 get a material amount of the distribution, the

1 initial distribution.

2 BY MR. OPPENHEIMER:

3 Q. Okay. And in deciding whether a
4 distribution favors a given entity, did you consider
5 whether the entities presold any of the asset before
6 the asset was actually created?

7 A. So I'm generally aware that there were
8 offers -- like I'm aware that there were some sales
9 between Ripple Labs and the general public. I don't
10 know all the inner details of that.

11 Q. That's not my question.

12 My question is: In deciding whether a
13 distribution favors a given entity, did you consider
14 whether the entity presold any of the asset before
15 the asset was actually created?

16 A. Yeah. It was probably a consideration that
17 I made.

18 Q. Okay. And you're aware that the Ethereum
19 creators presold some ETH before they actually
20 created the blockchain; right?

21 A. So I'm generally aware that they offered
22 tokens in the exact chronology. I'm not exactly

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1 sure, but it's technically possible to presell.

2 Q. Are you aware that Ripple Labs and the
3 creators of the XRP Ledger did not presell any XRP
4 before the XRP Ledger was launched?

5 MR. TAYLOR-COPELAND: Objection.

6 THE WITNESS: So sitting here today, I
7 don't recall whether they presold or not any XRP
8 before the creation of the ledger.

9 BY MR. OPPENHEIMER:

10 Q. Why didn't you mention this factor within
11 this opinion?

12 A. Because even if it is a presale, they take
13 possession of it first. So it is still allocated to
14 Ripple Labs. You can say that they have a legal
15 obligation to fulfill the presale, so that's fine.
16 I'm not here offering legal opinions. I'm just
17 saying what the ledger tells us is that those units
18 were given to Ripple Labs.

19 Q. Right. But you didn't take into account
20 the fact that ETH was presold when the Ethereum
21 ledger was launched?

22 A. So I can tell you what I wrote about that.

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1 Q. Just answer my question, please.

2 A. Sure.

3 Q. You didn't take into account the fact that
4 ETH was presold when the Ethereum ledger was
5 launched, did you?

6 MR. TAYLOR-COPELAND: Objection.

7 THE WITNESS: So I probably took that into
8 account.

9 BY MR. OPPENHEIMER:

10 Q. Where is that in your report?

11 A. So the reference to it would be on page 64,
12 which is appendix B.4. So it doesn't go into
13 mechanically what happened when, but it does note
14 that there was an initial Coin offering of ETH. And
15 that was -- I'm considering that as part of the
16 initial allocation of ETH. So whether it went to
17 Ethereum and then to someone else or went directly
18 to other people is a distinction that is not in the
19 report.

20 Q. You also didn't note in section 4.4 of your
21 report how much Bitcoin went to Satoshi Nakamoto,
22 did you?

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1 A. So in section 4.4, I did not. I don't have
2 an opinion on how much Bitcoin went to Satoshi
3 Nakamoto.

4 Q. Are you aware that there is a Bitcoin
5 wallet with more than 1 million Bitcoins in it
6 that's believed to belong to Satoshi Nakamoto?

7 MR. TAYLOR-COPELAND: Objection.

8 THE WITNESS: So I'm aware of facts that
9 that sounds similar to what you're presenting to me.

10 BY MR. OPPENHEIMER:

11 Q. And that's out of just 20 million or so
12 Bitcoins that will ever be created; right?

13 MR. TAYLOR-COPELAND: Objection.

14 THE WITNESS: So it's true that Bitcoin has
15 a cap at 21 million, I think.

16 BY MR. OPPENHEIMER:

17 Q. So out of the roughly 21 million Bitcoin
18 that will ever be created, more than 1 million are
19 in this one particular wallet; right?

20 MR. TAYLOR-COPELAND: Objection.

21 THE WITNESS: So sitting here today I don't
22 know if that's true, but let me accept that as

1 represented.

2 ///

3 BY MR. OPPENHEIMER:

4 Q. Okay. Let's go to page 37 in your report.

5 This is your opinion 5. It says, "Validators in the
6 XRP Ledger require external incentives."

7 That's at line 1. Do you see that?

8 A. I do.

9 Q. How do you define "external incentives"?

10 A. So incentives would be some form of revenue
11 that I would generate by being a validator. So all
12 three systems give consideration to that question.
13 What I would define as an internal incentive would
14 mean that's internal to the protocol itself. So the
15 protocol dictates the terms under which I receive
16 it, when, how much, that type of thing. And then by
17 saying that they require external incentives, I mean
18 the implication is that there are no internal
19 incentives.

20 But yet people continue to run the
21 validators. And so people are running validators
22 with no internal incentives. Then they must have an

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1 incentive. Otherwise, there would be no one running
2 it, therefore, it must be external.

3 Q. So to be clear you said incentives would be
4 some form of revenue. Are you offering an opinion
5 that financial incentives are required?

6 A. So --

7 MR. TAYLOR-COPELAND: Objection.

8 THE WITNESS: -- I said that -- I don't
9 know what I said, but certainly what I mean is that
10 revenue is an example of an internal incentive.
11 It's sufficient for it to be one, but it's not
12 necessary.

13 BY MR. OPPENHEIMER:

14 Q. Okay. So you used the term "external
15 incentives" in your report here.

16 A. Yes.

17 Q. I would like to know how you defined it. I
18 don't want examples. I want your definition.

19 A. So an external incentive would be an
20 incentive -- and that doesn't mean financial, just
21 utility to the validator -- that is not coming from
22 the protocol itself.

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1 Q. Okay. So an external incentive doesn't
2 have to be financial; is that right?

3 A. Correct.

4 Q. Well, if you look at page 38, at lines 1
5 through 4, you write, "The requirement that
6 economically rational participants are incentivized
7 to act as validators on the XRP Ledger only through
8 outside financial incentives is a plausible
9 explanation for why Ripple Labs was the only entity
10 acting as a validator on the recommended validator
11 list until July 2018."

12 So help me understand. Do you think that
13 financial incentives are required or not?

14 A. So as it reads, financial incentives are a
15 plausible explanation. That's not the same as
16 saying they are required.

17 Q. Okay. So you're offering a plausible
18 explanation. You're not saying that it is
19 necessarily the only explanation?

20 A. That's correct.

21 Q. And you're not saying it's the only
22 plausible explanation. There could be others;

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1 right?

2 A. That sentence does not exclude that
3 possibility.

4 Q. Okay. Now, you agree that an external
5 incentive could be altruism; right? You write that
6 in your report?

7 A. Can you point that out?

8 Q. Sure. Page 37, line 21.

9 A. Okay. So I see the word "altruism." So
10 yes, I do agree.

11 Q. Someone can choose to run an XRP Ledger
12 validator based on altruism; right?

13 A. Yes. That's what I meant by writing this.

14 Q. And someone can choose to run an XRP Ledger
15 validator because they like the idea that it uses
16 less electricity than Bitcoin; right?

17 MR. TAYLOR-COPELAND: Objection.

18 THE WITNESS: I mean, if that were the
19 rationale, then they wouldn't run it at all because
20 that would use even less electricity.

21 BY MR. OPPENHEIMER:

22 Q. Someone could say --

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1 A. I mean, you still make the choice to either
2 run it or not.

3 Q. Someone could say, you know what, I think
4 cryptocurrencies are here to stay, but I think the
5 XRP Ledger uses a lot less electricity than Bitcoin
6 and so I want to support the XRP Ledger by running a
7 validator, couldn't they?

8 MR. TAYLOR-COPELAND: Objection.

9 THE WITNESS: Okay. So it's correct that
10 someone could say that. But the answer to your
11 question is that the reason they're doing it is
12 because they want to support the XRP Ledger. Right?
13 So that -- that's sort of what I mean by altruism,
14 is that they want to support the ledger. So that's
15 a valid reason to run a validator.

16 BY MR. OPPENHEIMER:

17 Q. Someone could say, I think this rippled
18 protocol is really interesting computer code and I
19 just want to set up a validator that runs it,
20 couldn't they?

21 MR. TAYLOR-COPELAND: Objection. Calls for
22 speculation.

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1 THE WITNESS: Yes. So I don't know why
2 people would run it or not run it. I'm not offering
3 that opinion. My opinion is just that there is no
4 internal incentive to do it. But can I rule that
5 out? No, I can't rule that out.

6 BY MR. OPPENHEIMER:

7 Q. How much does it cost to run an XRP Ledger
8 validator?

9 A. I don't know the dollar amount.

10 Q. You don't know sitting here today if it
11 costs a dollar or a million dollars; right?

12 A. So I could maybe put some rough bounds on
13 it.

14 Q. You didn't attempt to do that in your
15 report, did you?

16 A. Exactly. The report does not offer
17 anything beyond the fact that it's not zero.

18 Q. Was there anything stopping you from trying
19 to figure it out for your report?

20 A. So the -- I mean, what I'm arguing is
21 comparisons between Bitcoin, Ethereum, and XRP. So
22 that's not a difference -- besides the proof of work

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1 that's contributed in Bitcoin, all of them basically
2 require the same amount of work. So I wasn't --
3 it's a point of commonality between all three.

4 Q. You could have launched a XRP Ledger
5 validator of your own and measured how much
6 electricity it was using; right?

7 A. Yes. I can -- I could launch a validator
8 myself and I could measure the amount of electricity
9 it would use.

10 Q. Now, both the Bitcoin and Ethereum
11 blockchains have nodes on them that aren't miners,
12 but just report on what's in the blockchain and
13 submit transactions to it, that sort of thing. Are
14 you familiar with that concept of nodes?

15 A. So I'm familiar with the concept called
16 full nodes, which I believe you're referring to.

17 Q. Okay. Is that a fair definition of full
18 nodes? I'm happy to have you offer a different one
19 if it's not.

20 A. Sure. So the idea of submitting
21 transactions is never done by nodes. So users can
22 do it for themselves. You don't have to run a node

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1 to submit a transaction, so that --

2 Q. Okay.

3 A. So it's solely about validation.

4 Q. So what do full nodes do on the Bitcoin and
5 Ethereum blockchains?

6 MR. TAYLOR-COPELAND: Objection.

7 THE WITNESS: So a full node can serve one
8 of two purposes. One reason is that -- or one
9 purpose of it is so that you have -- you understand
10 what the current state of the ledger is. So you
11 can't understand that unless if you're running a
12 node. Doesn't mean you want to contribute to
13 consensus. You don't want to mine. You just want
14 to have that data.

15 So there is lots of examples of, say,
16 companies or things like that that need that data,
17 and so that's why they would choose to run a full
18 node.

19 The other answer is that it's more relevant
20 on Ethereum, but there is this concept of an
21 archival node or a historical archive node. And
22 these will keep a complete history of the

1 blockchain, in addition to just validating new
2 transactions that are happening.

3 BY MR. OPPENHEIMER:

4 Q. Full nodes on the Bitcoin and Ethereum --
5 let's try that again.

6 Full nodes on the Bitcoin and Ethereum
7 blockchains don't get any internal incentives or
8 rewards for being full nodes, do they?

9 A. So the way I define internal incentives as
10 in the protocol gives them, so they don't.

11 Q. So presumably to run a full node on Bitcoin
12 or Ethereum, it would also require the same external
13 incentives as running a full node on the XRP Ledger;
14 is that right?

15 A. Okay. So let's take it one at a time. So
16 to run a full node on Bitcoin or Ethereum does
17 require external incentives.

18 Q. Do you have any --

19 A. Are they the same external incentives in
20 that case than -- well, you sort of transition to
21 now talking about full nodes on XRP Ledger. I don't
22 know if that was deliberate or you meant validators.

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1 Q. Well, let me ask this. There is full nodes
2 on the XRP Ledger as well; right?

3 A. So yes.

4 Q. Do you have any reason to think that there
5 are different external incentives required to run a
6 full node on the XRP Ledger compared to running a
7 full node on the Bitcoin or Ethereum ledgers?

8 A. So I'm not crazy about you saying
9 "required," but I mean, everyone -- you're doing
10 it -- there is a reason for why you're doing it.
11 And the set of the reasons would have a lot of
12 overlap between the two protocols.

13 Q. And if someone is already running an
14 XRP Ledger full node, what's the marginal cost of
15 running a validator, in other words, the additional
16 cost to run a validator once you've already decided
17 to run a full node?

18 A. Okay. So I just need to clarify. You mean
19 a validator that's on the list or not on the list?

20 Q. Let's start with not on the list.

21 A. And by cost do you mean like dollar amount
22 and electricity, for example, or are you -- what

1 does cost mean?

2 Q. Any cost that you can think of that would
3 go into running a full node and a validator.

4 A. Okay. So sitting here today I don't know
5 the dollar amount of electricity that would be
6 required. So the costs are basically -- you have
7 the capital costs of acquiring the server. It needs
8 to have high specifications. It's not just like any
9 computer. Let's say we do a good job. Maybe
10 ordinary computers could do something. So the
11 capital cost would be the same.

12 I don't think that, you know, if you start
13 signing transactions as opposed to just propagating
14 them, it doesn't -- it just requires more
15 computation. There will be electricity costs, but
16 it will be marginal.

17 Q. Isn't it true that the additional cost to
18 run a validator for someone who is already running a
19 full node on the XRP Ledger is essentially zero?

20 A. It's -- I just -- the statement I said was
21 that it is marginal.

22 Q. My question is: Isn't it true that it is

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1 essentially zero?

2 MR. TAYLOR-COPELAND: Objection.

3 THE WITNESS: I would say it is nonzero.

4 So no, I wouldn't accept that.

5 BY MR. OPPENHEIMER:

6 Q. You don't accept --

7 A. I would say that's small.

8 Q. You don't accept that it is essentially
9 zero?

10 A. Yeah. I don't accept that it is
11 essentially zero.

12 Q. Okay. Let me show you a document that we
13 are going to mark as Exhibit 164.

14 (Exhibit 164 marked for identification.)

15 BY MR. OPPENHEIMER:

16 Q. Exhibit 164 is a copy of the transcript of
17 the deposition of David Schwartz from the SEC
18 matter. This is one of the documents that you
19 considered in forming your opinions in this case;
20 right?

21 A. I believe -- yeah, I recognize this
22 document.

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1 Q. Okay. Let me have you take a look at
2 internal page 147 of this exhibit.

3 A. Okay.

4 Q. And what you can see is, at lines 2 through
5 14, the question is:

6 "What is the financial incentive for
7 someone to run a validator?

8 "Answer: Generally, people would run a
9 validator because they needed to run an XRP Ledger
10 node anyway, like it was part of their business or
11 part of what they were doing. The additional cost
12 to run a validator is essentially zero.

13 "Question: So, for example, an exchange
14 might run a validator for that reason?

15 "Answer: Right. They'd be running a
16 server anyway in order to process transactions, and
17 the additional cost to make it a validator is
18 essentially zero. It's almost literally just you
19 enter one command."

20 Are you offering an opinion that David
21 Schwartz was wrong about the cost of running a
22 validator?

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1 A. Everything he said is I think exactly
2 consistent with what I said.

3 Q. Okay. You can put that aside.

4 A. When I say "everything," in the quote, not
5 everything that he ever said.

6 Q. Okay. I don't think anyone was going to
7 have that confusion, but thank you for the
8 clarification.

9 In forming this opinion, did you interview
10 anyone who runs a validator?

11 A. I did not.

12 Q. Do you know one way or the other whether
13 there are people who run validators on the
14 XRP Ledger who don't receive any external financial
15 incentives to do so?

16 MR. TAYLOR-COPELAND: Objection.

17 THE WITNESS: So I know -- I know things,
18 but I guess the strict answer to that would be no.

19 So I do know people who run validators, but
20 I do not know for sure whether or not it's a
21 financial incentive or not.

22 BY MR. OPPENHEIMER:

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1 Q. Do you know anyone who runs validators on
2 the XRP Ledger system?

3 A. I do.

4 Q. Who?

5 A. So I know -- when I say "people," maybe not
6 individuals, but I know professors who are part of
7 the -- so on line 7 of page 38, I refer to the
8 University Blockchain Research Institute. So I know
9 people who are a part of that program.

10 What I know is that being part of that
11 program requires running a validator. And so they
12 at least orchestrated that a validator would be run.
13 Whether that means they are personally running it or
14 not, I wouldn't necessarily infer that.

15 Q. Are you aware that there was a sworn
16 discovery response in this case discussing the
17 number of validators on the XRP Ledger system that
18 Ripple owns or controls -- manage or controls?
19 Excuse me.

20 A. I didn't understand your question.

21 Q. Are you aware that there was a sworn
22 discovery response in this case discussing the

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1 number of validators that Ripple Labs manages or
2 controls?

3 MR. TAYLOR-COPELAND: Objection.

4 THE WITNESS: So I don't know what a sworn
5 discovery response is.

6 BY MR. OPPENHEIMER:

7 Q. We'll start with this. You understand what
8 discovery responses are; right?

9 A. Like a response report, correct.

10 Q. You listed a set of discovery responses as
11 materials you considered in exhibit -- appendix D on
12 your report; right?

13 A. So I included all the things that I
14 considered. I don't know like what they're called,
15 like what the official legal title of things are.

16 Q. Go to page 83 of your report, please.
17 Line 15, heading D.5 says "Discovery Responses and
18 Objections."

19 Do you know what that means?

20 A. So I believe that it's a list of documents
21 that are responses.

22 Q. Did you come up with that heading?

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1 MR. TAYLOR-COPELAND: Objection. I'm going
2 to instruct him not to answer to the extent that
3 that gets into the -- yeah, I'm going to instruct
4 him not to answer.

5 THE WITNESS: I'll accept that instruction.

6 MR. OPPENHEIMER: You're instructing him
7 not to answer if he came up with it? I think it's a
8 yes or no question.

9 MR. TAYLOR-COPELAND: To the extent that
10 there was back and forth regarding drafting, that's
11 privileged, so...

12 BY MR. OPPENHEIMER:

13 Q. Mr. Clark, did you write your report
14 yourself?

15 A. I did.

16 Q. Including appendix D?

17 A. So everything was edited and it was a
18 collaboration --

19 Q. Okay.

20 A. -- between myself and my attorneys.

21 Q. So who came up with the term "discovery
22 responses"? Was that you or the attorneys?

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1 MR. TAYLOR-COPELAND: I'm going to instruct
2 him not to answer the question.

3 THE WITNESS: I accept that.

4 MR. TAYLOR-COPELAND: Privilege is the
5 basis.

6 BY MR. OPPENHEIMER:

7 Q. After seeing the heading in Exhibit D.5 --
8 or line heading D.5 -- sorry -- do you believe you
9 have an understanding sitting here today of what
10 discovery responses are?

11 A. I do.

12 Q. Okay. So I will represent to you that
13 there were discovery responses that someone swore to
14 under oath as true involving the number of
15 validators that Ripple Labs managed or controlled.

16 Did you consider that discovery response in
17 connection with offering an opinion about validators
18 on the XRP Ledger?

19 A. So everything I considered is in this list.
20 Are you saying there is something that's not in this
21 list?

22 Q. Sure. Let me show you a new document.

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1 We'll mark it as Exhibit 165.

2 (Exhibit 165 marked for identification.)

3 BY MR. OPPENHEIMER:

4 Q. Exhibit 165 is the Defendants' Supplemental
5 Responses to Lead Plaintiff's Interrogatories, Set
6 Three. This set of supplemental responses doesn't
7 appear in your appendix D, does it?

8 A. I believe it's only contained in a
9 footnote, not in appendix D.

10 Q. Which footnote contains this supplemental
11 response?

12 A. So I believe page 25, footnote 12.

13 Q. That states the response to interrogatory
14 number 7. Did you consider the response to
15 interrogatories 5 and 6 from Exhibit 165?

16 A. So if it's not listed in the report, I
17 believe I did not consider it.

18 Q. Okay. Now, interrogatory number 5 here
19 that's on page 7 of Exhibit 165 calls for
20 information about any validator participating in the
21 consensus process, the person or entity who
22 controlled the validator, that person or entity's

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1 relationship to you, which I'll represent to you is
2 defined as the defendants in this case.

3 Do you think that would have been useful
4 information for you to have in forming your opinions
5 in this case?

6 A. Okay. So let me clarify. In your earlier
7 question, I understood you to say that the document
8 we cited is not this document. But what you're
9 saying is that we cited this document, but just I
10 cited like one section of the document, but, of
11 course, I had access to the whole document.

12 Q. Let's take this one step at a time.

13 You didn't list this document in exhibit --
14 appendix D; right?

15 A. I don't believe that I did --

16 Q. Okay.

17 A. -- but --

18 Q. Now, in footnote 12 on page 25, you listed
19 the supplemental response to interrogatory number 7;
20 right?

21 A. Okay. So that citation for my
22 interpretation is I'm citing this document and then

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1 I'm giving you a further like pointer to where in
2 this document for this particular thing. So I am
3 citing the document, but I'm also pointing out for
4 what footnote 12 relates to in the report, which
5 part of it.

6 And so generally if there is something that
7 was either in the list of references or in the
8 footnotes, it didn't necessarily make it into
9 appendix -- well, whatever the appendix is.

10 Q. Did you read the response to interrogatory
11 number 5 from this document before you wrote your
12 report?

13 A. So this document looks familiar. I can't
14 recall sitting here today what it -- if I read the
15 whole thing or if I skimmed it or what.

16 Q. So you don't know one way or the other
17 whether you read the response to interrogatory
18 number 5?

19 A. That's correct.

20 Q. And I assume you'd have the same answer as
21 to interrogatory number 6?

22 A. That is correct.

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1 Q. Okay. As a general rule, having more
2 miners on Bitcoin, on the Bitcoin blockchain,
3 contributes to Bitcoin's security thanks to the
4 proof of work protocol; right?

5 A. Yes. So it would contribute specifically
6 to the collusion resistance of the protocol.

7 Q. And you agree that the XRP Ledger doesn't
8 use proof of work for security; right?

9 A. Yes, I agree with that.

10 MR. OPPENHEIMER: Okay. Let's go off the
11 record.

12 THE VIDEOGRAPHER: Off the record, 1:48 --
13 excuse me -- 2:48 p.m.

14 (Recess, 2:48 p.m. to 2:58 p.m.)

15 THE VIDEOGRAPHER: This begins media file
16 number 6 in today's testimony of Jeremy Clark.

17 We're back on the record at 2:58 p.m.

18 BY MR. OPPENHEIMER:

19 Q. I'd like to direct you to your report,
20 Exhibit 159 at page 25. Now at lines 22 through 25
21 here, you write, "Every validator constructs a list
22 of transactions it has seen and considers valid, and

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1 circulates it to the other validators. Each
2 validator keeps the transactions that are being
3 supported by the other validators and discards the
4 transactions that are not."

5 Do you see that?

6 A. I do.

7 Q. What's that understanding based on?

8 A. Okay. So this first front part of the
9 report is a summary of like the details, the full
10 details. So the -- it would be a repeat of the
11 information but with further detail in the appendix.
12 And then I'll try and see what citations I included.

13 So it would be covered in appendix C.3 on
14 page 71. Most of it is based on the documentation
15 from the XRPL website. And then -- I mean, I read a
16 lot of material from everything that I considered,
17 and so it's just -- it's things that I read
18 somewhere.

19 Q. Things that you read somewhere?

20 A. Your question is do I know it because I
21 read it somewhere? The answer is yes.

22 Q. But you don't know where?

1 A. So sitting here today I don't know the
2 exact things. I'm sure it's -- I'm pretty confident
3 that it's covered in the XRPL documentation, which I
4 did read, that would go through it. But every like
5 little small detail may have come from a different
6 source.

7 Q. Okay. So when you say a validator discards
8 the transactions that are unsupported by others,
9 discards where? Where does it go?

10 A. So this is -- yes. So I'm trying to
11 explain it in a way that a judge could understand.

12 So a transaction, it doesn't maybe
13 discard -- anyways, so it removes it from its open
14 ledger. Let's put it that way.

15 Where does it go? It goes back to the pool
16 of pending transactions.

17 Q. Okay.

18 A. It may be included in future ledger
19 updates. It can come back. So if there is -- in
20 the future if all of a sudden now people are
21 supporting it, then it will be included. So it's
22 not ignored. It's just temporarily not included in

1 that ledger update.

2 Q. Do you consider that to be discarded?

3 A. Yeah. So it is discarded from the open
4 ledger. I believe that's the terminology that's
5 used more or less in describing it. It's pretty
6 consistent with how people describe it.

7 Q. Okay. Will an honest node on the
8 XRP Ledger ever discard entirely a transaction it
9 considers valid?

10 A. Under this definition, yes. So if discard
11 means remove it from the open ledger, it will. But
12 again, it goes back to the pool of pending
13 transactions. So it could -- it will -- it will
14 keep it and keep trying to include it in a ledger
15 until it gets the full -- not the full support, but
16 a quorum of support.

17 Q. Okay. Let me take you to page 35 now.

18 A. Okay.

19 Q. At line 19 you write, "My conclusion is
20 that the lack of meritocracy towards validators in
21 the XRP Ledger represents a material difference
22 between the XRP Ledger and Bitcoin/Ethereum.

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1 Bitcoin/Ethereum are open, permissionless systems
2 that allow -- that accept new validators without any
3 enrollment or authorization from trust anchors. The
4 XRP Ledger is not a permissionless system with
5 respect to validators in practice."

6 Do you see that?

7 A. I do.

8 Q. In the Bitcoin ledger, if a Bitcoin miner
9 is unhappy with the consensus process, how does that
10 miner change the process?

11 MR. TAYLOR-COPELAND: Objection.

12 THE WITNESS: Okay. So the way the
13 consensus protocol would be changed in Bitcoin has
14 nothing to do with whether you're a miner or not.
15 It's just -- I mean, there is a protocol. And so if
16 you want to have a change to the protocol, then
17 there is a process that involves proposing the
18 change. And then if enough miners accept the
19 change -- so as a miner, you can sort of vote to
20 accept it.

21 But this is all at a social level, so there
22 is nothing in the protocol that says -- there is

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1 nothing in the software that says -- sorry. There
2 is nothing in the software itself that would actuate
3 a change that was voted on.

4 BY MR. OPPENHEIMER:

5 Q. You agree that the XRP Ledger can also be
6 changed at what you call the social level; right?

7 A. I do, yes. There is an amendment process
8 that is very similar to how Bitcoin and Ethereum
9 both would implement changes.

10 Q. And short of implementing amendments, the
11 XRP Ledger can also be changed at the social level
12 by having a large group of validators adopt a new
13 UNL; right?

14 A. Okay. So this doesn't -- I mean, it
15 doesn't change the XRP Ledger. It doesn't change
16 the consensus mechanism of the XRP Ledger. But what
17 that represents is a change in terms of who the
18 validators are that are participating in the
19 protocol itself.

20 So if you look at page -- so if you look at
21 page 32, there is an enumerated list at number 6 and
22 that list describes the case that you're talking

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1 about.

2 Q. Now, Bitcoin miners can censor transactions
3 from being included in the new blocks on the Bitcoin
4 blockchain; right?

5 MR. TAYLOR-COPELAND: Objection.

6 THE WITNESS: No, that's not true.

7 BY MR. OPPENHEIMER:

8 Q. Bitcoin miners can choose to write empty
9 blocks on the Bitcoin blockchain; right?

10 A. That is true.

11 Q. And they can delay or refuse the inclusion
12 of transactions that they don't want to include if
13 that particular miner gets to write the next block,
14 can they?

15 MR. TAYLOR-COPELAND: Objection.

16 THE WITNESS: Yes. So the way I would
17 state it is that Bitcoin miner can censor
18 transactions in their own blocks.

19 BY MR. OPPENHEIMER:

20 Q. Right. Censorship isn't permitted on the
21 XRP Ledger, is it?

22 MR. TAYLOR-COPELAND: Objection.

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1 THE WITNESS: Okay. So the way that
2 censorship is handled on the XRP Ledger is different
3 than how it's handled on Bitcoin. So a censoring
4 node on the XRP Ledger cannot vote to include a
5 transaction. That's the action that they can take.

6 Will it ultimately end up in the ledger if
7 a quorum decides that it should end up in the
8 ledger, then it will. So it's probably --
9 censorship is always probabilistic. So what's the
10 probability you solve the next block in Bitcoin
11 versus what's the probability that a quorum is going
12 to reject a transaction on the XRP Ledger?

13 BY MR. OPPENHEIMER:

14 Q. Right. And in the Bitcoin blockchain, a
15 single Bitcoin miner controls each block in its
16 entirety; right?

17 MR. TAYLOR-COPELAND: Objection.

18 THE WITNESS: So -- I mean, more or less
19 correct. So just to be specific, so a miner can
20 choose which transactions to include in a block or
21 not.

22 BY MR. OPPENHEIMER:

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1 Q. Right. But it's a single miner that gets
2 to write each block as it comes up; right?

3 MR. TAYLOR-COPELAND: Objection.

4 THE WITNESS: So it doesn't work the way
5 that you're saying.

6 BY MR. OPPENHEIMER:

7 Q. The miner that solves the computational
8 problem on Bitcoin first gets to write the next
9 block on the Bitcoin blockchain; correct?

10 A. Yes, that's not correct. That's incorrect.

11 Q. What's incorrect about that?

12 A. So the person who solves the computational
13 puzzle will circulate that block. Then it's up for
14 other miners to decide whether they want to compete
15 with that block or if they want to extend it.

16 Assuming that all miners extend it, which
17 is the natural -- that's what you want the protocol
18 to do, then their block will become the next block
19 in the blockchain.

20 But there is no guarantee -- there is
21 absolutely cases where miners are not first, but
22 their blocks still get included for reasons of

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1 propagation and things like that.

2 Q. But if other miners decide to compete with
3 that block, then ultimately what happens is another
4 miner proposes the block that should come next in
5 the chain; right?

6 A. That's correct, yes. So one -- at some
7 point there will be another block in the chain and
8 what transactions are included in that block or not
9 was at the discretion of the miner that included it.

10 Q. Right. On the XRP Ledger, the next ledger
11 in the chain gets decided by the agreement of
12 multiple parties; right?

13 A. Can you repeat the question? Sorry.

14 Q. Yes. On the XRP Ledger, the next ledger
15 that gets written in the chain, the transactions
16 within that ledger we should say, get decided by
17 agreement of multiple parties; right?

18 A. Yes. So there is a difference between how
19 XRP and Bitcoin work, whereas XRP takes a consensus
20 of a transaction by transaction level as opposed to
21 a block base level.

22 Q. But multiple parties have to agree in order

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1 to approve the inclusion of the transactions; right?

2 A. That's correct. So every transaction
3 that's included in the next ledger receives a quorum
4 of support from the validators.

5 Q. Okay. You talked earlier about the
6 negative UNL, or nUNL, a bit. I want to take you
7 back to that. It's at page 79 in your report.

8 And what you wrote here, at lines 11
9 through 13, is "If this negative validator list
10 (negative UNL or nUNL) achieves 80 percent support
11 from other validators on a given validator's
12 validator list, the validator is not considered
13 during the consensus phase."

14 What's your basis for saying that the nUNL
15 has an effect on what's considered at the consensus
16 phase?

17 A. So I see that I don't provide a citation,
18 but this is described on the XRPL documentation,
19 this protocol and how it works and what its purpose
20 is.

21 Q. It's your understanding that a validator on
22 the nUNL can't participate in the consensus process;

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1 is that right?

2 A. So they -- okay. So the way I -- you might
3 phrase it is that they're no longer considered in
4 the quorum. So the quorum threshold changes because
5 this validator got put on the list.

6 Q. Can a validator that's on the nUNL propose
7 transactions?

8 A. Yes. Any -- you don't have to be a
9 validator to propose a transaction. Any entity on
10 the network can.

11 Q. Can it still sign transactions?

12 A. It can do everything. So a very common
13 scenario is say it's offline or say like for some
14 reason there is some sort of network issue, it's
15 still running. It is still doing everything a
16 validator does. It's just that people can't hear
17 it for some reason. There is some network
18 propagation.

19 So it's still -- it's participating in the
20 sense that it is doing the work of validating. It's
21 just not contributing meaningfully to consensus
22 because, for whatever reason, its participation

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1 isn't being reached by the other validators.

2 Q. Switching gears a bit.

3 You've never testified as an expert in
4 litigation before; right?

5 A. That's correct.

6 Q. Have you ever been deposed before today?

7 A. No. This is my first time.

8 Q. You've never testified at trial as an
9 expert before; right?

10 A. No, I have not.

11 Q. And I take it from those answers then that
12 no court has ever ruled on whether your testimony
13 would be admissible as expert opinion; right?

14 A. That's correct.

15 Q. What, if anything, did you do to prepare
16 for today's deposition?

17 A. So I reread my expert report. I reread the
18 rebuttal report. I met with counsel. I reviewed a
19 deposition that was given on Monday from one of your
20 witnesses. I looked at two exhibits that were part
21 of that deposition. I reviewed those.

22 That's more or less what I can recall.

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1 Q. Which two exhibits?

2 A. So my recollection is one was a magazine
3 article and the other was a press release from
4 Ripple Labs. Both of them describe the addition
5 through the amendment process that we discussed
6 earlier of an escrow feature to the XRP Ledger.

7 It was announced from Ripple Labs, so the
8 implication being that Ripple Labs supported it and
9 sort of engineered the software and had it added to
10 the list. I noted that at that time they did
11 control the entire dUNL.

12 And then the escrow subsequently was used
13 to escrow some of the funds that were initially
14 allocated to Ripple Labs during the initial
15 allegation, which I also did discuss in my report.

16 Q. Did you consider those two particular
17 exhibits at the time you wrote your initial report?

18 A. If they're not included in the appendix, I
19 would not have considered them. If they are
20 included, then they were provided to me, but I
21 didn't have -- I don't recall looking at them in
22 detail today.

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1 Q. Okay. So you read them earlier this week,
2 and sitting here today you don't recall reading them
3 in detail at the time you worked on your original
4 report; is that right?

5 A. That's correct.

6 Q. Okay. You mentioned that you met with
7 counsel to prepare for your deposition today. How
8 many times?

9 A. I believe it was three times.

10 Q. And approximately how long each time?

11 A. Two were two-hour virtual meetings, and
12 one was an in-person meeting of -- I don't know --
13 maybe six hours.

14 Q. Was anyone present other than you and
15 counsel?

16 A. No.

17 Q. Have you discussed your testimony today
18 with anyone else?

19 A. You mean the content of the testimony or
20 the fact that I'm giving testimony?

21 Q. Let's start with the content.

22 A. The content, I have not.

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1 Q. How about the fact that you are giving
2 testimony?

3 A. Yeah. Sure. So my family know that I'm
4 here. My university knows. There is various times
5 where I've had meetings that conflicted with my work
6 on this file that I had to say why I wasn't working
7 or why I was postponing a meeting or something to
8 that extent.

9 Q. Approximately how many hours did you spend
10 preparing your initial report in this matter?

11 A. So the total amount of time I spent on this
12 was somewhere between, let's say, 200, 250 hours. I
13 would say maybe 60 or 70 percent of that was -- I
14 mean, a lot of it was just reading, which kind of
15 goes into the report. It wasn't the drafting of the
16 report, but I would say a substantial amount of that
17 time was on the report itself.

18 Q. And approximately how much time did you
19 spend preparing your rebuttal report?

20 A. I don't know. Maybe between -- maybe,
21 let's say, about 20 hours, something like that.

22 Q. Okay. If I can direct you to page 6 of

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1 your opening report. At lines 13 through 15 you
2 write, "All opinions are mine and do not necessarily
3 reflect those of the Raymond Chabot Grant Thornton,
4 Catallaxy, the Natural Sciences and Engineering
5 Research Council of Canada (NSERC), or Concordia
6 University."

7 Did you discuss your opinions with anyone
8 at any of those institutions?

9 A. I did not.

10 Q. Why did you feel the need to say that the
11 opinions aren't theirs?

12 A. So if you go back to page 4, line 10, I
13 listed those organizations here. And so I felt it
14 was necessary because I had listed them there to
15 also disclaim that they had nothing to do with the
16 report.

17 Q. Okay. Have you ever purchased XRP?

18 A. No, I have not.

19 Q. How about Bitcoin?

20 A. Yes.

21 Q. Do you hold any Bitcoin today?

22 A. I do.

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1 Q. How much approximately?

2 A. Approximately between 10,000 and \$20,000

3 Canadian.

4 Q. Have you ever purchased any other
5 cryptocurrencies?

6 A. So I have acquired other cryptocurrencies.

7 Q. Do you hold any of them today?

8 A. I do.

9 Q. What other cryptocurrencies do you hold
10 today?

11 A. So there is too many to enumerate, but I
12 can tell you sort of the biggest. So the biggest
13 ones would be -- there is a token called ARB and
14 then there is various flavors of ETH that I own
15 as well. So I would say between BTC, ETH, and ARB,
16 that would represent 90, 95 percent of what I hold.

17 Q. What's the approximate Canadian dollar
18 value of the BTC, ETH, and ARB that you hold?

19 A. Roughly between 30 and \$40,000 Canadian.

20 Q. We talked earlier about running an XRP
21 validator that you hadn't. Have you ever run a
22 miner or a validator on any other cryptocurrency

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1 network?

2 A. I have.

3 Q. Which blockchains have you run a miner for?

4 A. So I did not run a miner. I have not run a
5 miner on any blockchain.

6 Q. How about a validator?

7 A. So I have run a full node on Bitcoin.

8 Q. Approximately when did you run that full
9 node?

10 A. Maybe in 2012, 2013. So I can clarify that
11 at the time, if you use Bitcoin, you had to run a
12 full node. You had no choice. So a full node is
13 not a miner. It's just how the software works. Now
14 today we have what are called lightweight clients
15 where you can use Bitcoin without operating a full
16 node.

17 Q. At page 6 of your opening report, lines 10
18 and 11, you say that you are being compensated by
19 plaintiffs' counsel at 175 Canadian dollars per hour
20 before university fees. Can you explain what
21 "before university fees" means here?

22 A. Yes. So my payment is routed through my

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1 university, and my university charges an overhead.

2 Q. So counsel pays the university and then the
3 university pays you?

4 A. That's correct.

5 Q. Approximately what percentage or dollar
6 amount is the university's overhead?

7 A. Of the 175, it would be less than \$25.

8 Q. Okay.

9 A. Sorry. I should say less than -- no.
10 That's correct. Less than \$25.

11 Q. Okay. Let's turn to your CV starting at
12 page 92 of your report. Actually a little past
13 that, page 4 of the CV, you list degrees there.

14 You have a PhD in computer science; is that
15 right?

16 A. That's correct.

17 Q. You got that PhD in 2011?

18 A. That's correct.

19 Q. Did you study cryptocurrencies during your
20 PhD?

21 A. Okay. So the main focus of my research
22 was on cryptography -- I mean, a lot of it has to

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1 do with how you define a cryptocurrency. So Bitcoin
2 was more or less not invented until the end of my
3 PhD. I looked at Bitcoin. I looked at earlier
4 versions of digital cash that use cryptographies,
5 therefore, you could consider cryptocurrencies.

6 The main focus of my thesis was on
7 cryptographic voting, so voting systems that use
8 cryptography. The lead researcher on that is David
9 Chaum who invented cryptocurrencies in 1982, '83.
10 So we had a lot of discussions of cryptocurrencies,
11 but the research output was more concentrated on the
12 voting problem.

13 Q. Okay. Fair to say your experience with
14 blockchains like Bitcoin and subsequently created
15 ones came mostly after your PhD?

16 A. At the tail end of my PhD or at the start
17 of my postdoc, yes. So my postdoc is listed on --
18 below.

19 Q. Right. And you currently work as an
20 associate professor at Concordia University; right?

21 A. That's correct.

22 Q. That's the only university where you've

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1 held a faculty position since your PhD and postdoc;
2 right?

3 A. That's correct.

4 Q. Now, on page 3 of your CV, there is a
5 section called consulting work. The first line
6 that's listed there is undisclosed digital asset
7 subject with Susman Godfrey. Is that this case?

8 A. That is.

9 Q. When were you first engaged in this case?

10 A. So I believe it was in the summer of 2022.

11 Q. Have you ever spoken to the lead plaintiff
12 Bradley Sostack?

13 A. No, not to my knowledge.

14 Q. Okay. The second line in the section is
15 undisclosed cryptocurrency subject, Williams &
16 Connolly. I take it you never testified in that
17 case; right?

18 A. It was not a case.

19 Q. Okay.

20 A. And I didn't testify because it wasn't a
21 case.

22 Q. You didn't write any reports in connection

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1 with that engagement?

2 A. That's correct.

3 Q. And the third one here, City of Toronto,
4 that was not in connection with litigation; right?

5 A. That's correct.

6 Q. That's a case -- or that was an engagement
7 that involved voting security; is that right?

8 A. Yeah. It was an analysis of voting systems
9 that were under procurement by City of Toronto.

10 Q. Okay. So is this present engagement with
11 Susman Godfrey the first time you've ever been
12 engaged as a litigation expert?

13 A. It's the first time I've served as an
14 expert witness. Is that the same as a litigation --

15 Q. As an expert witness.

16 A. Yes.

17 Q. Same thing.

18 A. Yes. Yes.

19 Q. Okay. And there haven't been any
20 additional engagements as an expert witness since
21 the time you wrote this CV?

22 A. Yeah, that's correct.

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1 Q. So this is your only one?

2 A. This is my first and only.

3 Q. Okay. Approximately what percentage of
4 your income is derived from your consulting
5 engagement with Susman Godfrey over the last year or
6 so?

7 A. I'd have to compute the numbers, but let's
8 say -- rough math might be 20 percent or something.

9 Q. Okay. Rough math is fine for this purpose.

10 A. Okay.

11 Q. Let's go to page 23 of your CV. This is --
12 appears to be a list of courses that you've taught;
13 is that right?

14 A. That's correct.

15 Q. And am I right that the first course that
16 you taught on blockchain technology was in the
17 fourth term of 2022?

18 A. No. That was the most recent.

19 Q. Okay. So there is earlier iterations of it
20 that --

21 A. There are. So it's kind of --

22 Q. Let me finish.

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1 So there are earlier iterations of it that
2 aren't listed on this chart; is that right?

3 A. That's not correct.

4 Q. Okay. When did you teach blockchain
5 technology before fourth term of 2022?

6 A. So the first time I taught it -- I know why
7 it's confusing -- is listed under the course code
8 INSE 6630 in 2017/2, which means the fall term.

9 So the reason is I -- if you want the
10 explanation. At Concordia they have what's called a
11 slot course. So slot course is a course code that's
12 in the calendar. Any faculty can teach it on any
13 subject. Once you teach it twice on a particular
14 subject and it goes well and the students like it,
15 then you're allowed to turn it into a permanent
16 code.

17 So I taught the blockchain twice under 6630
18 and then it got turned into a permanent code. So it
19 was taught for the first time in 2022 under the new
20 code, but the course is the same all three years.

21 Q. Have you ever taught a course on XRP or the
22 XRP Ledger?

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1 A. So I've taught courses on blockchain
2 technology. To the extent that XRP is a blockchain
3 technology, it would be covered, but I've never
4 taught a course that scoped only to XRP.

5 Q. Have you had any particular classes or
6 units within a course that are scoped particular to
7 XRP?

8 A. I have not.

9 Q. Did you ever review the rippled source code
10 prior to your engagement in this case?

11 A. I don't recall a specific instance where I
12 would have, but it's possible.

13 Q. But not that you recall?

14 A. But not that I recall.

15 Q. And you've never published something
16 specific about XRP before; right?

17 A. So I -- going back to your earlier question
18 of preparing for this deposition, I did try to see
19 what I had said about XRP in my academic papers. So
20 no academic paper is scoped to XRP directly, but
21 there are mentions of it.

22 Q. None actually about XRP or the XRP Ledger;

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1 correct?

2 A. There is -- yeah, there is statements about
3 XRP, but they're not -- but they're not an entire
4 paper.

5 Q. It's not the focus of any of your
6 publications?

7 A. Sure. Sure. Let's go with that.

8 Q. Okay. On page 17 of your CV, you've got a
9 section here titled "Press & Media." These are
10 places where you've been quoted in the press or
11 media, not your affirmative publications; is that
12 right?

13 A. So I think it's a mix of both. So some are
14 references to my research and some are where I'm
15 specifically quoted. So it includes both.

16 Q. Okay. These aren't peer-reviewed
17 publications, are they?

18 A. No. This is like journalism.

19 Q. Okay. On page 19, you've got a section
20 headed "Concordia Promotional Activities."

21 Can you explain what that is?

22 A. So Concordia is the university that I work

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1 at, and so these are a set of -- it could be an
2 event or it could be a publication or a magazine
3 that's put out by Concordia. And so I just -- when
4 you go for tenure, you want to show that you are
5 supporting the university, and so that's why they're
6 separated out from everything else. So they could
7 get blended in with everything else, but it's --
8 that's the reason why it's a separate section.

9 Q. Are you paid separately for this work or
10 this is just part of your salary at Concordia?

11 A. For the work on this case?

12 Q. No. For the Concordia promotional
13 activities.

14 A. This is part of my salary at Concordia.

15 Q. Have you gotten tenure from Concordia?

16 A. I have.

17 Q. Congratulations.

18 A. Thank you.

19 Q. Have you ever held a job working for an
20 issuer of any cryptocurrency?

21 A. No, I have not.

22 Q. What about for any entity that is active in

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1 cryptocurrency space, for example, the Ethereum
2 Foundation?

3 A. No. I've never been employed by anyone
4 other than Concordia University and Carleton
5 University.

6 Q. Sure. When did you first become aware of
7 the existence of the XRP Ledger Foundation?

8 A. So I couldn't say for sure sitting here
9 today. It certainly became clear once I engaged on
10 this case and started reading everything.

11 Q. Do you know if you had ever heard of it
12 prior to your engagement in this case?

13 A. I suspect I may have, but -- I think it's
14 probable that I had.

15 Q. How about Ripple Labs, had you ever heard
16 of Ripple Labs before your engagement in this case?

17 A. I had.

18 Q. And how did you first become aware of
19 Ripple Labs?

20 A. So I can't recall exactly today. I have a
21 suspicion of how it went. Do you want to hear it or
22 it's just what I know for sure?

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1 Q. Sure.

2 A. So as you know, XRP --

3 Q. Just to make the record clear, what's your
4 suspicion?

5 A. So XRP was -- became one of the most
6 dominant cryptocurrencies, so I heard about it.

7 One of the core developers of the
8 XRP Ledger is someone that I -- there is a website
9 that both of us used to post very prolifically on
10 it. I believe around that time he would have
11 indicated that he worked for not Ripple Labs, but
12 OpenCoin, I believe it was called at the time. I
13 suspect at that time I at least sort of looked to
14 try and figure out what exactly this company is.

15 Q. What was name of that developer?

16 A. So the screen name is Joel Katz and the
17 real name is David Schwartz.

18 Q. And what was the name of the website that
19 you both posted to?

20 A. It was called Stack Exchange.

21 Q. Did you form any opinions about Ripple Labs
22 prior to your engagement in this case?

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1 A. What do you mean? Like did I have thoughts
2 about them?

3 Q. Did you have any views about Ripple Labs
4 before you got engaged in this case?

5 A. No. I would say no.

6 MR. OPPENHEIMER: Let's go off the record.

7 THE VIDEOGRAPHER: Off the record,
8 3:33 p.m.

9 (Recess, 3:33 p.m. to 3:41 p.m.)

10 THE VIDEOGRAPHER: This begins media unit
11 number 7 of today's testimony of Jeremy Clark. Back
12 on the record at 3:41 p.m.

13 MR. OPPENHEIMER: Thank you, Mr. Clark. I
14 have no further questions at this time.

15 MR. TAYLOR-COPELAND: I have just a couple
16 of questions.

17

18 EXAMINATION

19 BY MR. TAYLOR-COPELAND:

20 Q. Professor Clark, earlier today you were
21 asked whether you were opining about whether XRP
22 purchasers had to trust Ripple Labs. Do you recall

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1 that?

2 A. Yes, I do.

3 Q. Okay. What did you understand "trust" to
4 mean in that question?

5 A. Trust in the recommended validator list
6 from Ripple Labs.

7 Q. Are you offering any opinions about what
8 XRP purchasers knew, understood, or believed when
9 purchasing XRP?

10 A. No, I'm not.

11 Q. Are you offering any opinion about Ripple's
12 marketing or promotion of XRP?

13 A. I'm not.

14 MR. TAYLOR-COPELAND: I have nothing
15 further. Thank you.

16 MR. OPPENHEIMER: I think I had one
17 question after that.

18

19 FURTHER EXAMINATION

20 BY MR. OPPENHEIMER:

21 Q. Are you offering any opinions in this case
22 that XRP purchasers knew how the XRP Ledger operated

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1 at the time they purchased XRP?

2 A. No. I don't know what was in the minds of
3 XRP purchasers.

4 MR. OPPENHEIMER: Nothing further for me.

5 MR. TAYLOR-COPELAND: Nothing further.

6 THE VIDEOGRAPHER: This concludes today's
7 testimony of Jeremy Clark. We're going off the
8 record at 3:42 p.m.

9 THE REPORTER: I'm going to put on my
10 record, Counsel.

11 Mr. Taylor-Copeland, did you need to order
12 an expedite transcript?

13 MR. TAYLOR-COPELAND: Yes, please.

14 THE REPORTER: And rough draft?

15 MR. TAYLOR-COPELAND: I don't think we need
16 a rough draft, no.

17 THE VIDEOGRAPHER: Do you need a copy of
18 the video?

19 MR. TAYLOR-COPELAND: Yes, please.

20 THE REPORTER: Do you know when you want
21 the transcript? I'll have it ready Tuesday.

22 MR. TAYLOR-COPELAND: That's fine.

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1 (Deposition adjourned at 3:43 p.m.)

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1 CERTIFIED SHORTHAND REPORTER'S CERTIFICATE

2 I, Cynthia J. Vega, a Certified Shorthand
3 Reporter for the State of California, do hereby
4 certify:

5 That the witness in the foregoing
6 deposition was by me duly sworn; that the deposition
7 was then taken before me at the time and place
8 herein set forth; that the testimony and proceedings
9 were reported by me stenographically and were
10 transcribed through computerized transcription under
11 my direction; and the foregoing is a true and
12 correct record of the testimony and proceedings
13 taken at that time.


14 I further certify that I am not of counsel
15 or attorney for either or any of the parties in the
16 foregoing proceeding and caption named or in any way
17 interested in the outcome of the cause in said
18 caption.

19 IN WITNESS WHEREOF, I have subscribed my
20 name this 24th day of October, 2023.

Reading and Signing was not requested.

21

22


Cynthia J. Vega, CSR No. 6640

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1 Jeremy W. Clark, c/o

TAYLOR-COPELAND LAW

2 501 West Broadway, Suite 800

San Diego, California 92101

3

Case: In re Ripple Labs. Inc., Litigation

4 Date of deposition: October 20, 2023

Deponent: Jeremy W. Clark

5

6 Please be advised that the transcript in the above
referenced matter is now complete and ready for signature.

7 The deponent may come to this office to sign the transcript,

8 a copy may be purchased for the witness to review and sign,

9 or the deponent and/or counsel may waive the option of

10 signing. Please advise us of the option selected.

11 Please forward the errata sheet and the original signed

12 signature page to counsel noticing the deposition, noting the

13 applicable time period allowed for such by the governing

14 Rules of Procedure. If you have any questions, please do

15 not hesitate to call our office at (202)-232-0646.

16

17

18 Sincerely,

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4 SIGNATURE PAGE
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5 Witness Name: Jeremy W. Clark
Deposition Date: October 20, 2023

6
I do hereby acknowledge that I have read
7 and examined the foregoing pages
of the transcript of my deposition and that:

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9 (Check appropriate box):
() The same is a true, correct and
10 complete transcription of the answers given by
me to the questions therein recorded.
11 () Except for the changes noted in the
attached Errata Sheet, the same is a true,
12 correct and complete transcription of the
13 answers given by me to the questions therein
14 recorded.

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16 _____
17 DATE WITNESS SIGNATURE
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2 1730 M Street, NW, Suite 812
3 Washington, D.C. 20036
4 (202) 232-0646

5

6 ERRATA SHEET

7

8 Case: In re Ripple Labs. Inc., Litigation

9 Witness Name: Jeremy W. Clark

10 Deposition Date: October 20, 2023

11 Page No. Line No. Change

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22 Signature

Date

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