



Transcript of Todor Cooklev, Ph.D.

Wednesday, September 18, 2024

MediaTek Inc. v. Bell Northern Research, LLC

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REMOTE ORAL DEPOSITION - TODOR COOKLEV, Ph.D.
September 18, 2024

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

MEDIATEK INC. AND NXP USA §
INC., §

Petitioner §

vs. §

CASE NO. IPR2023-01414
Patent No. 8,416,862

BELL NORTHERN RESEARCH §
LLC, §

Patent Owner §

REMOTE ORAL DEPOSITION

TODOR COOKLEV, Ph.D.

September 18, 2024

(Reported Remotely)

REMOTE ORAL DEPOSITION OF TODOR COOKLEV Ph.D.,

produced as a witness at the instance of the Petitioner

and duly sworn, was taken in the above-styled and

numbered cause on the 18th day of September, 2024, from

9:07 a.m. to 12:45 p.m., before Annette E. Escobar,

Certified Shorthand Reporter in and for the State of

Texas, reported by computerized stenotype machine, taken

remotely, pursuant to Federal Rules of Evidence, and the

provisions stated on the record or attached hereto.

REMOTE ORAL DEPOSITION - TODOR COOKLEV, Ph.D.
September 18, 2024
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REMOTE ORAL DEPOSITION - TODOR COOKLEV, Ph.D.
September 18, 2024

1

INDEX

2

WITNESS:

PAGE

3

TODOR COOKLEV

4

Examination by Mr. Erickson 4

5

Examination by Mr. Shapiro 48

6

Reexamination by Mr. Erickson 49

7

Deposition concluded 50

8

Errata Sheet 53

9

Witness Signature 54

10

11

EXHIBITS

12

13

EXHIBIT

DESCRIPTION

PAGE

14

1:

IEEE Std 802.11a-1999

36

15

2:

IEEE Std 802.11a-1999
(Supplement)

38

16

3:

Wwise Proposal

43

17

4:

IEEE P802.11 Wireless LANs TGn
Sync Proposal

45

18

19

20

PREVIOUSLY MARKED EXHIBITS

21

1001:

U.S. Patent No. 8416862

5

22

1004:

U.S. Patent 7236748 (L1 748)

26

23

1008:

Reducing the computations of the
Singular Value Decomposition
Array Given by Brent and Luk
(Yang)

32

24

25

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson
P-R-O-C-E-E-D-I-N-G-S

1

2 Whereupon,

3 9:07 a.m.

4

5 THE COURT REPORTER: Good morning. My
6 name is Annette Escobar, Texas CSR No. 5475. I will be
7 administering the oath and reporting the deposition
8 remotely by oral stenography.

9 The witness is located in Fort Wayne,
10 Indiana.

11 Counsel, would you please state your
12 appearances, starting with petitioner.

13 MR. ERICKSON: For petitioner Brian
14 Erickson with the law firm of DLA Piper.

15 MR. SHAPIRO: Okay. I'm Jason Shapiro of
16 the Devlin Law Firm. With me today is my colleague
17 Srikanth Cheruvu; we represent the patent owner Bell
18 Northern Research in this matter.

19 TODOR COOKLEV, Ph.D.,
20 having been first duly sworn, testified as follows:

21 EXAMINATION

22 BY MR. ERICKSON:

23 Q. Good morning, Dr. Cooklev.

24 A. Good morning.

25 Q. Is there anything that would prevent you from

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 providing full and complete testimony this morning?

2 A. I don't think so.

3 Q. Do you have any other applications up on your
4 computer other than the zoom application?

5 A. No, I don't. I closed even my e-mail window.
6 No other applications open.

7 Q. Okay. Do you have any other materials related
8 to this case around you?

9 A. Yes. The only thing that I have is I have here
10 a clean unmarked copy of my declaration.

11 Q. Okay. I am going to drag into the chat window
12 as copy of Exhibit 1001, which is the 862 patent, and I
13 understand you have a physical copy of your declaration,
14 which is marked Exhibit 2001; is that correct?

15 A. Yes, that's correct.

16 Q. Okay. Great.

17 A. And I confirmed I downloaded Exhibit 1001.

18 Q. Great.

19 A. That you had uploaded.

20 Q. Great. If you want to open that as well for a
21 series of questions that will relate to your declaration
22 in the patent, so if you want to open that up and have
23 that ready just in case that would be helpful.

24 A. Okay. I've opened Exhibit 1001.

25 Q. Okay. All right. Beginning with your

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 declaration Exhibit 2001, can you turn to paragraph 24,
2 please.

3 A. Of my declaration?

4 Q. Yes.

5 A. Yes, I'm looking at paragraph 24.

6 Q. Okay. In paragraph 24 you note that the patent
7 claims priority to June 28, 2005. Do you see that?

8 A. I do.

9 Q. If you look at Exhibit 1001, which is the 862
10 patent, you see on the cover that there are several
11 claims of priority in the paragraphs marked 63 and 60.
12 Do you see those?

13 A. I do.

14 Q. Why of the dates on the cover of the 862 patent
15 did you select the priority date June 28th, 2005?

16 MR. SHAPIRO: Objection, form, and
17 outside the scope, and irrelevant.

18 A. I don't think I was asked to provide an opinion
19 about the priority date. I see in my declaration I list
20 June 28, 2005, which is the date in a line or paragraph
21 63, but I did not analyze the priority date, I wasn't
22 asked to.

23 Q. Do you recall having ever seen the application
24 identified in paragraph 63 on the cover of the 862
25 patent?

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 MR. SHAPIRO: Objection, form, and
2 outside the scope, and relevance.

3 A. Do I recall seeing it, I haven't recently
4 looked at it.

5 Q. (By Mr. Erickson) Do you recall having ever
6 seen it?

7 MR. SHAPIRO: Objection, form; relevance;
8 outside the scope.

9 A. As far as ever, I think this is part of the
10 file history and, therefore, as far as ever I have seen
11 it, it's just that I haven't seen it recently.

12 Q. Have you ever analyzed the application
13 identified in paragraph 63 on the cover of the 862
14 patent to determine whether it supports any of the
15 claims of the 862 patent?

16 MR. SHAPIRO: Objection, form; relevance,
17 outside the scope.

18 A. No, I haven't. I wasn't asked to do that.

19 Q. Have you ever analyzed either of the
20 applications identified in paragraph 60 on the cover of
21 the 862 patent to determine whether either of them
22 supports any of the claims of the 862 patent?

23 MR. SHAPIRO: Objection, form; relevance;
24 outside the scope.

25 A. I was not asked to do that.

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 Q. Did you do it?

2 MR. SHAPIRO: Objection, form; relevance,
3 outside the scope; asked and answered.

4 A. No. Basically if I -- if I wasn't asked to do
5 it, since I wasn't asked to do it, I did not.

6 Q. Turning to paragraph 30 of your declaration.

7 A. I'm looking at it, counsel.

8 Q. Do you have an opinion as to what the level of
9 ordinary skill is for a person of ordinary skill in the
10 art of the 862 patent?

11 MR. SHAPIRO: Objection, form.

12 A. Well, as it states in the declaration, I
13 adopt -- well, I adopt with a, with a -- there is a
14 comment, but I adopt the Board's definition of person of
15 ordinary skill to the extent that it does not -- it does
16 not just try to substitute experience for education. So
17 I just -- I have adopted the, the definition that a
18 person of ordinary skill in the art at the time of the
19 invention has bachelor's degree in electrical
20 engineering.

21 I do know that there is some fairly
22 advanced algebra in math involved, and so this kind of
23 algebra will require at least a bachelor's degree. So
24 that's generally what I state in paragraphs 29 and 30.

25 Q. In your opinion, a person of ordinary skill in

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 the art would be skilled in the matrix algebra concepts
2 described in the 862 patent?

3 MR. SHAPIRO: Objection, form.

4 A. Are you asking me whether a person of ordinary
5 skill in the art would be skilled or should be skilled?

6 Q. In your opinion, a person of ordinary skill in
7 the art would have -- would be skilled, so let me
8 restate the question.

9 Is it your opinion that a person of
10 ordinary skill in the art would be skilled in the matrix
11 algebra concepts described in the 862 patent?

12 MR. SHAPIRO: Objection, form.

13 A. Well, first I'm just trying to understand the
14 question and -- first, I think the -- I'm not a lawyer,
15 but the concept of a person of ordinary skill in the art
16 has been explained to me by counsel, and I think as I
17 state in paragraph 25, a person of ordinary skill in the
18 art is a hypothetical person who is presumed to have
19 known and understood the relevant art at the time of the
20 invention. And so that's why, that's why this
21 definition of a person of ordinary skill in the art is
22 important.

23 And I think the, the definition should be
24 such that a person of skill should have understood the
25 matrix algebra, the matrix algebra and the math that's

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 here. So that's how the -- they should be defined.

2 They should be defined in a way that they should have
3 understood it, and if this is accomplish they would have
4 understood it.

5 Q. In your opinion --

6 A. At least maybe some of the -- maybe I can add,
7 at least some of the matrix algebra is, goes beyond
8 what, what a person with bachelor's degree generally
9 knows.

10 Q. Would a person of ordinary skill in the art be
11 skilled in performing matrix algebra where the matrix
12 has complex elements?

13 MR. SHAPIRO: Objection, form.

14 A. Will the person of ordinary skill in the art be
15 skilled in matrix algebra where the matrix here is
16 complex elements?

17 First, if we -- I'm the person of ordinary
18 skill in the art, if we use the Board's definition with
19 the qualification that experience cannot substitute for
20 education, just because of the, of the fairly
21 sophisticated math, if we use this definition, they'll
22 have some skills with matrix algebra and where the
23 matrices have complex elements. As I said, they would
24 have had some skills.

25 We can, we will see that for some of the

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 asserted prior references the math does get, does get as
2 I said more sophisticated and beyond generally the
3 knowledge of someone with bachelor's degree.

4 Q. In your opinion, some of the prior art is
5 beyond the level of ordinary skill in the art?

6 MR. SHAPIRO: Objection, form.

7 A. I think it is correct to say that, that some of
8 the matrix algebra or in some prior art references is
9 beyond what as I said generally a person with bachelor's
10 degree knows.

11 Q. Moving to paragraph 47 of your declaration.
12 Let me know when you are there, please.

13 A. I'm there.

14 Q. In the first sentence of paragraph 47 you state
15 that the 862 patent inventors recognize that using
16 training symbols throughout the wireless transmission
17 such as interspersed where data symbols increase the
18 overhead with associated with performing channel
19 estimation. Do you see that sentence?

20 A. I do.

21 Q. You don't cite any portion of the 862 patent in
22 paragraph 47 in support of that statement; is that
23 correct?

24 MR. SHAPIRO: Objection, form.

25 A. There's no citation in paragraph 47.

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 Q. What is the basis for your opinion in paragraph
2 47?

3 MR. SHAPIRO: Objection, form.

4 A. Just for the record, I'm reviewing
5 Exhibit 1001, which is perhaps Exhibit 1 of the
6 deposition.

7 I -- I reviewed quickly the patent, the
8 specifications, so it -- I think it will take me more
9 time to, just to give you, like, a more complete answer.
10 But there's a general -- the patent recites -- this
11 generative recites number of data bits per RDM symbol,
12 there's generally a concern about spectrum efficiency,
13 so there is also a concern about overhead.

14 So, but to give you better answer it will
15 take me some more time reviewing the specification.

16 Q. In paragraph 48 of your declaration you
17 identify that the inventors recognize there were several
18 advantages, and the paragraph identifies them as first,
19 second, third, and finally -- can you take a moment to
20 review paragraph 48 and let me know when you are
21 finished.

22 A. Yes, I'm there. It's a long paragraph.

23 Q. What is your basis for your opinion that the
24 inventors recognized the advantages that you outlined in
25 paragraph 48?

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 MR. SHAPIRO: Objection, form.

2 A. I reviewed paragraph 48, I looked at the
3 surrounding paragraph just quickly looking at the
4 specification.

5 Q. What is your basis for the opinion that the
6 inventors recognize the advantages you discuss in
7 paragraph 48?

8 MR. SHAPIRO: Objection, form.

9 A. Well, at least because the specification
10 recites a preamble sequence. For example, in column 14
11 around line 20 it says the receiving wireless
12 communication device receiving a preamble sequence from
13 the transmitting wireless device in estimating a channel
14 response H, from the preamble sequence, a person of
15 skill have recognized that the -- because it's a
16 preamble sequence, the channel estimation would be less
17 impacted by noise.

18 Q. Is there any other basis for your opinion that
19 the inventors recognize the advantages you discuss in
20 paragraph 48 of your declaration?

21 MR. SHAPIRO: Objection, form.

22 A. I think also, I think also because it's a
23 preamble sequence, that is sent at the beginning of a
24 transmission. A person of skill have recognized that
25 the synchronization is one of the first tasks and, in

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 that it could have advantageously be accomplished using
2 the preamble sequence.

3 Q. Anything else?

4 MR. SHAPIRO: Objection, form.

5 A. And generally, the, the invention, the 862
6 invention is about reducing overhead, reducing
7 complexity, improving the efficiency. It's entitled
8 efficient feedback of channel information.

9 So I think that that also a person of
10 skill have recognized that the patent is about improving
11 the, reducing the complexity and improving the
12 efficiency of the transmission process as I state in
13 paragraph 48.

14 Q. Anything else?

15 MR. SHAPIRO: Objection, form.

16 A. I think this is what -- well, what comes to my
17 mind right now. I -- maybe if I study it more maybe I
18 will come up with something else.

19 Q. First sentence of 48 you state prior to the
20 transmission of data carriers containing pay load data.
21 Do you see that?

22 MR. SHAPIRO: Objection, form.

23 A. Excuse me. First sentence of 48?

24 Q. At the very end of the first sentence in
25 paragraph 48 of your declaration you conclude the phrase

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 "prior to the transmission of data carriers containing
2 pay load data." Do you see that phrase?

3 A. Yes, I do. I was looking at the wrong place.

4 Yes, I do see prior to the transmission of data carriers
5 containing pay load data.

6 Q. And if you turn to paragraph 65 of your
7 declaration --

8 A. Looking at it.

9 Q. -- you note in the second sentence you say, "I
10 note that as a general matter every packet is
11 information sent before something else, but every packet
12 and every symbol are not a preamble sequence." Do you
13 see that sentence?

14 A. I do.

15 MR. SHAPIRO: Objection, form.

16 Q. (By Mr. Erickson) Okay. So going back to
17 paragraph 48 when you state prior to the transmission of
18 data carriers containing pay load data, what do you
19 mean?

20 A. First, I don't see any problem keeping in mind
21 paragraph 65 or that portion of paragraph 65. I don't
22 see at all how that, that is -- I'm not sure if you are
23 suggesting that that is a possible contradiction; I
24 disagree.

25 Now, I can -- I think I can answer your

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 question. What, what do I mean by prior to the
2 transmission of data carriers containing pay load data?
3 I think it's -- I think actually this is, this is very
4 clear that it's very clear and unambiguous.

5 Q. When you say prior to in paragraph 48, do you
6 mean at any time prior to?

7 MR. SHAPIRO: Objection, form.

8 A. Oh, I -- now I -- I think I understand better.

9 And thank you for the question, counsel.

10 It's not -- it's not any time prior. It's
11 not -- that, that -- that type is just we can say any
12 time prior.

13 First -- I mean, I do -- I think this is
14 related to the, the meaning of a preamble sequence that
15 as I, as I state -- I will find the, the paragraph.

16 So paragraph 69 a preamble is a segment at
17 the beginning of a transmission. So when I state prior
18 to the transmission of data carriers, it's a segment at
19 the beginning of a transmission just prior to the
20 transmission of data carriers. Now also keeping, in
21 some cases there may not be any data.

22 So that's what -- that's what I mean,
23 right. It doesn't make sense if it's one day before the
24 transmission of data carriers.

25 Q. In your opinion, a preamble may not have any

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 data carriers at all? I'm sorry. In your opinion, a

2 preamble may not be followed by any carriers at all?

3 MR. SHAPIRO: Objection, form.

4 A. I think that's correct. There's -- as a

5 special case there may not be any data.

6 Q. Even if the preamble is not followed by

7 anything else it can still be a preamble under your

8 instruction?

9 MR. SHAPIRO: Objection, form.

10 A. Yes.

11 Q. (By Mr. Erickson) Going back to paragraph 48,

12 where does the 862 patent discuss the relationship

13 between the training symbols and pay load data?

14 MR. SHAPIRO: Objection, form.

15 A. My declaration is written from the perspective

16 of a person of ordinary skill in the art. This is what

17 a person of skill would have understood about preamble

18 sequence, and -- so that's, that is what I can say in

19 response to your question.

20 Q. Moving at paragraph 69 of your declaration, and

21 you state a segment at the beginning of a transmission?

22 A. Yes.

23 Q. Are you referring to -- strike that.

24 Can you explain whether, what you mean by

25 transmission, and specifically, are you referring to a

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 single packet or continuous stream of bits or how do you
2 define a transmission?

3 MR. SHAPIRO: Objection, form.

4 A. Well, first I, I don't think I agree that
5 continuous stream of bits doesn't -- this doesn't seem
6 correct to me.

7 So first a transmission here it's, it's an
8 ODF, and so it -- it's something that a person of skill
9 would have understood an ODF transmission as having a
10 beginning and an end.

11 So I think that's the -- I think just in
12 short a transmission is a transmission and it has a
13 something, a beginning has an end. And it may contain a
14 pay load which is the, the bits, it may, but doesn't
15 have to. I think we established earlier that there are
16 transmissions which just do not contain any pay load, so
17 this is the transmission.

18 You said also packet, and that can be
19 ambiguous, because if a packet is associated with a pay
20 load that could be, that could be ambiguous.

21 Q. Do you agree that a standalone transmission of
22 a preamble sequence without anything else is within the
23 scope of the claimed preamble sequence?

24 MR. SHAPIRO: Objection, form.

25 A. I -- I think, yes. Yes, it is within the

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 scope.

2 Q. (By Mr. Erickson) So would you agree that the
3 clause at the beginning of a transmission in your
4 definition of preamble could be reworded to mean which
5 may or may not be at the beginning of a transmission?

6 MR. SHAPIRO: Objection, form.

7 A. So you are saying a segment which may or may
8 not be at the beginning of a transmission, and then
9 continuing on with the definition, that's the
10 suggestion?

11 Q. Yes.

12 A. If these a suggestion, no, I don't agree with
13 this. I clearly state in paragraph 69 something that I
14 think is not in agreement with your suggestion. It's a
15 segment at the beginning of a transmission, so that --
16 so this is what I think a preamble is.

17 Q. So, in your opinion, a preamble must be
18 followed by something else specifically the remainder of
19 the transmission, correct?

20 MR. SHAPIRO: Objection, form.

21 A. Well, as a special case there may not be
22 something else. No, I don't think it must be followed,
23 and I don't think the plain and ordinary meaning that
24 I'm providing in paragraph 69 requires that it is
25 followed.

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 So if it is not followed by something else

2 then that transmission will consist only of, of a

3 preamble or a preamble sequence, and that's okay.

4 So that transmission will only have a

5 beginning segment or portion. If it is -- again, if it

6 is not followed by something else it will consist only

7 of a beginning, and that's fine.

8 In other cases, yes, it is followed by

9 something else and then that transmission will after the

10 beginning there will be another portion.

11 MR. SHAPIRO: Counsel, we've been for

12 about an hour now. Should we take a quick break.

13 MR. ERICKSON: I'm happy to break now or

14 I can keep going. Dr. Cooklev, how are you? Whatever

15 you'd like to do.

16 THE WITNESS: I'm fine with a ten-minute

17 break.

18 MR. ERICKSON: Okay. Let's go off

19 record.

20 [Short break taken at 10:09 AM.]

21 [We're back on the record 10:25.]

22 Q. (By Mr. Erickson) Dr. Cooklev, did you discuss

23 the substance of your testimony with anyone during the

24 break?

25 A. No, I did not.

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 Q. Turning back to your declaration Exhibit 2001,
2 and turning to paragraph 70. Please let me know when
3 you are there.

4 A. I'm there.

5 Q. Okay. Why would a preamble sequence with only
6 a single training symbol -- let me -- strike that
7 question.

8 Why, in your opinion, must a preamble
9 sequence include at least two training symbols?

10 A. Because it's called sequence, and it more
11 accurately the entire term is "preamble sequence", so
12 this is why.

13 Q. Why wouldn't a single training symbol that
14 consists of a sequence of bits not be sufficient?

15 MR. SHAPIRO: Objection, form.

16 A. Well, first, a training symbol you said
17 includes a sequence of bits, but a training symbol does
18 not include of a sequence of bits, that's what makes it
19 a training symbol. And I think the term "preamble
20 sequence" would have been understood by a person of
21 skill as I state as two or more training symbols in the
22 preamble.

23 Q. A beamformer with two transmit antennas --
24 strike that.

25 Would transmitting two training symbols at

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 the same time over two different transmitting antennas

2 be sufficient under your proposed instruction?

3 MR. SHAPIRO: Objection, form and

4 relevance.

5 A. In your question you said two transmit

6 antennas. I think the number of transmit antennas here

7 is not relevant, so that's what I can say about preamble

8 sequence.

9 Q. In your opinion, must the two or more training

10 symbols be transmitted in series?

11 MR. SHAPIRO: Objection, form; relevance.

12 A. I don't think I considered this.

13 Q. Do you have an opinion on whether a beamformer

14 that transmits the same training symbols but on multiple

15 transmission antennas would satisfy your requirement

16 that there be two or more training symbols?

17 MR. SHAPIRO: Objection, form; relevance.

18 A. So the question a beamformer that is

19 transmitting the same symbol from using multiple

20 antennas?

21 Q. Yes.

22 A. Well, it seems to me your question, counsel, is

23 more directed to infringement. It's maybe even a

24 hypothetical question. But it's -- it's just something

25 that I don't think I have opined on in my declaration.

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 Q. Do you have an opinion as to whether the two or
2 more training symbols must be different from each other
3 or can all the training symbols be the same?

4 MR. SHAPIRO: Objection, form; relevance.

5 A. I don't specifically say in paragraph 70. It
6 seems to me they could be the same.

7 Q. In paragraph 71 you opine that your meanings of
8 preamble and preamble sequence are consistent with the
9 disclosures of the 862 patent. Do you see that
10 discussion in paragraph 71?

11 A. Yes.

12 Q. In your opinion, is there anything in the
13 intrinsic record that constitutes lexicography or a
14 definition?

15 MR. SHAPIRO: Objection. Objection,
16 form.

17 A. I am familiar with the term "lexicography". To
18 the extent it's related to the legal standards of claim
19 construction, I'm not a lawyer to provide an opinion.

20 What I'm saying in paragraph 71 is that a
21 person with skill reading the -- reading the patent,
22 trying to understand the claims in view of the
23 specification will have this understanding of the plain
24 and ordinary meanings of the terms "preamble" and
25 "preamble sequence".

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 I think there isn't, at least to the
2 extent I understand the question, there isn't
3 lexicography in the specification. And as I said, a
4 person of skill or reading the patents will understand
5 preamble as a segment at the beginning of a transmission
6 containing information that is known, that is expected I
7 say or known a priority by the receiver.

8 The sequence -- just to finish my thought,
9 but what the preamble sequence adds is now it becomes
10 two or more training symbols in the preamble.

11 Q. In your opinion, is there anything in the
12 intrinsic record that a person of ordinary skill in the
13 art would recognize as a disclaimer related to the
14 meaning of the terms "preamble" or "preamble sequence"?

15 MR. SHAPIRO: Objection, form; outside
16 the scope; relevance.

17 A. You know, that's a very precise question about
18 a disclaimer. And if I'm aware of anything in the
19 intrinsic record you said, I mean, since I don't state
20 something like this in my declaration, I -- sitting here
21 right now I'm not aware of a disclaimer, but, again,
22 that's just because it's not in my declaration.

23 I -- these paragraphs -- in these
24 paragraphs I'm explaining what a person of skill would
25 have understood, preamble and preamble sequence to mean

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 in the context of the 826 patent.

2 Q. In paragraph 71 you cite to the 862 patent
3 column 13, line 40 to 44. Do you see that?

4 A. Yes.

5 Q. Okay. Can you turn to the 862 patent and go to
6 column 13, lines 40 to 44?

7 A. I'm there.

8 Q. The 862 patent states on column 13 beginning
9 line 40, "Estimating the channel response includes
10 comparing received training symbols of the preamble to
11 corresponding expected training symbols using any of a
12 number of techniques that are known in the art."

13 A. That's correct.

14 Q. What techniques were known in the art for
15 comparing received training symbols of the preamble to
16 corresponding expected training symbol?

17 MR. SHAPIRO: Objection, form; outside
18 the scope.

19 A. And so first I will just maybe add to an
20 earlier answer. You asked me about the two or more
21 training symbols. And here we see that the, we see
22 training symbols of the preamble. So just this part
23 is -- supports, it is fully consistent and supports what
24 I'm explaining is the understanding of a person of skill
25 of a preamble sequence, which is I think a claim term.

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 So now the question what techniques were
2 known to compare received training symbols of the
3 preamble to corresponding expected training symbols.

4 Well, just maybe slightly generally there
5 are several signal processing techniques that I think
6 were known. For example, they have -- they are called
7 maybe zero forcing technique, that will be the simplest
8 technique. Then there is a technique based on the, it's
9 called MMSE or minimum mean square error. So that's the
10 objective of this technique.

11 There are also -- there was also a
12 technique called maximum likelihood. So generally, I
13 think these are some of the techniques that are known.

14 Q. I'm going to switch gears again and go to your
15 opinions related to the L1 748 reference. I just
16 provided a PDF of the L1 748 reference, which is
17 Exhibit 1004. I put that in the chat. If you want to
18 open that up and have that handy.

19 In paragraph 119 of your opinion in your
20 declaration you identify generator matrices G sub K that
21 are in Cartesian coordinates. Do you see that?

22 A. Paragraph 119?

23 Q. Yes.

24 A. Yes.

25 Q. Okay. And is it fair to say that, in your

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 opinion, the matrix V disclosed in Li 784 is also in
2 Cartesian coordinates; is that correct?

3 MR. SHAPIRO: Objection, form.

4 A. I think Li 784 establishes that V is an N by N
5 complex matrix that has N square, N square elements.
6 And that each of these N square elements has a real part
7 in the imaginary part.

8 Q. Would a person of ordinary skill in the art
9 understand that to be in Cartesian coordinates or polar
10 coordinates or something else?

11 MR. SHAPIRO: Objection, form.

12 A. I think real and imaginary parts will have been
13 understood as Cartesian coordinates.

14 Q. Are the matrices G_s of K -- I'll withdraw that.

15 Going back to your declaration at
16 paragraph 49 -- paragraph 49, you discuss a problem
17 inventors recognized related to providing feedback
18 information using Cartesian coordinates; is that fair?

19 MR. SHAPIRO: Objection, form.

20 A. I think as explained in the, in paragraph 49 --
21 well, this one example here just to illustrate the
22 problem with the amount of beamforming feedback
23 information, even in a two by two minus system where the
24 channel per subcarrier is two by two, and it's two by
25 two but with complex elements and this -- the feedback

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 becomes as calculated here, the feedback becomes around
2 1700 bits, so which is, which is significant for --
3 which is just significant to as a feedback. And this is
4 even -- and this is even a, just four bits for the real
5 and imaginary components, so it's not that accurate. If
6 we increase the number of bits it becomes even more.

7 Q. Paragraph 49 in the example you reference is
8 drawn from the 862 patent on three in the paragraph
9 beginning at line 26; is that right?

10 A. I think you are correct. Yes, that's right.
11 It's column 3 around -- beginning line 35.

12 Q. So it was known in the art to provide feedback
13 in Cartesian coordinates and the inventors recognize the
14 need to reduce the overhead associated with that
15 feedback, correct?

16 MR. SHAPIRO: Objection, form; outside
17 the scope.

18 A. Maybe of question got a little bit long for me.
19 But as I state in paragraph 50, for example, the
20 inventors can see that the invention is a way to reduce
21 the beamforming information.

22 THE COURT REPORTER: Counsel, I hate to
23 ask, but can we go off the record.

24 [Short break taken at 10:59 a.m.]

25 [We're back on the record 11:00 a.m.]

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 Q. (By Mr. Erickson) Dr. Cooklev, turning to claim
2 two of the 862 patent -- well, first let me know when
3 you are there.

4 A. Claim two.

5 Q. Yes, please.

6 A. Yes, I'm looking at it.

7 Q. Okay. Claim two includes the limitation the
8 receiving wireless device producing the estimated
9 transmitter beamforming unitary matrix V in Cartesian
10 coordinates. Do you see that limitation?

11 A. I do.

12 Q. In your opinion, and if the receiving wireless
13 devices produces the estimated transmitter beamforming
14 unitary matrix V and polar coordinates without first
15 producing it in Cartesian coordinates then claim two is
16 not practiced, correct?

17 MR. SHAPIRO: Objection, form; outside
18 the scope; relevance.

19 A. So to answer that, first your question is about
20 is claim two practiced, and I think that's clearly an
21 infringement question. So it's beyond the scope of the
22 IPR.

23 I would not agree with you because I
24 will -- it's just I will -- I have to analyze properly.
25 And I have to analyze how is the receiving wireless

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 device producing this estimated transmitting beamforming
2 unitary matrix. What is that process? And just based
3 on that, I will provide an opinion whether or not claim
4 two is practiced.

5 Q. Can the prior art satisfy claim two if it
6 discloses a receiving wireless device that produces the
7 estimated transformer beam -- let me restart.

8 In your opinion, can the prior art satisfy
9 claim two if it discloses the receiving wireless device
10 produces the estimated transmitter beamforming unitary
11 matrix V in polar coordinates without first producing it
12 in Cartesian coordinates.

13 [Short pause.]

14 Q. (By Mr. Erickson) In your opinion, can the
15 prior art satisfy claim two if it discloses the receiving
16 wireless device produces the estimated transmitter
17 beamforming unitary matrix V in polar coordinates
18 without disclosing it is first produced in Cartesian
19 coordinates?

20 MR. SHAPIRO: Objection, form. Outside
21 the scope.

22 A. Generally, my analysis regarding validity and
23 analysis of the prior art is similar to the analysis
24 that I will undertake for the purpose of infringement
25 and I look at the -- at the specific disclosure to

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 provide an opinion here.

2 It's very difficult, and also based on at
3 least, counsel, based on my understanding of how the
4 question of validity should be analyzed, it's difficult
5 to answer a question like that in the abstract if a
6 prior art doesn't do something, and there's something.
7 That becomes -- it becomes an abstract or even a
8 hypothetical question.

9 It's -- so I said I will look at the
10 specific prior art disclosure to see what it does and
11 doesn't do and come up with an opinion.

12 Q. Would a person of ordinary skill in the art
13 have known how to produce V and polar coordinates
14 without first producing the Cartesian coordinate?

15 MR. SHAPIRO: Objection; outside the
16 scope.

17 A. A person of ordinary skill in the art would
18 have known to produce V in polar coordinates without
19 first producing in Cartesian, I have not opined on this.

20 Q. Scan down to claim six, do you see the term
21 Givens rotation. Do you see that?

22 A. Claim six, yes.

23 Q. And you're familiar with what a Given rotation
24 is?

25 A. Yes, I'm familiar with Givens rotation.

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 Q. I'm sending via chat Exhibit 1008, the Yang
2 reference. If you could open that and let me know when
3 you have it open?

4 A. I'm looking at Yang. It is downloaded from the
5 chat.

6 Q. One of the methods Yang discloses is the Jacobi
7 SVD method, including disclosure at page 714. Do you
8 see that?

9 A. Page 17.

10 Q. 714. I'm sorry. Page two as stamped at the
11 bottom if you look at the stamped page numbers,
12 page 714.

13 A. Yeah, that's right. That's the page I've been
14 looking at.

15 Q. Great. Can you describe the difference between
16 a Givens rotation and the Jacobi SVD method, if there is
17 one?

18 MR. SHAPIRO: Objection, form; outside
19 the scope; relevance.

20 A. Counsel, I need to investigate this more to
21 give you a better answer as far as the comparison
22 between the Jacobi SVD method and the Givens rotation.

23 To the extent your question is just
24 limited to one Givens rotation, the Jacobi SVD method
25 is -- I mean, as described in Yang, for example, in this

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 interactive procedure and which is as the office
2 explained a property for parallel and systolic
3 implementations, while Givens rotation is just, is just
4 one rotation.

5 So I said that I just need to properly
6 consider that to give you, to make a proper comparison.

7 But the claim six of the 862 patent is --
8 depends from claim five and adds where in the QR the
9 composition comprises a Givens rotation.

10 So at least to some extent this, this,
11 there's an answer here that it's the claim specifically
12 decides the QR decomposition comprises a Givens
13 rotation.

14 Yang, if we look even at the first page of
15 Yang, the -- like the second paragraph, it says there
16 are numerically stable methods for computing complete
17 singular value and singular vector systems of dense
18 matrices, for example, the Jacobi SVD method and the QR
19 method and then there's another method that it also
20 lists. So the QR method is different from the Jacobi
21 SVD method according to Yang.

22 Q. Going back to the 862 patent column two, line
23 31, the 862 patent discusses or mentions the 802.11,
24 802.11(a), 802.11(b), 802.11(g) standards. Do you see
25 that?

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 A. Yes.

2 Q. Then in column nine it lists -- column 9 at
3 line 48 it lists some of those and adds 802.11(n). Do
4 you see that?

5 A. I'm getting to column nine. Which, which line
6 do you say of column nine?

7 Q. Forty-eight.

8 A. Oh, yes.

9 Q. Would a person of ordinary skill in the art
10 been aware of those standards?

11 MR. SHAPIRO: Objection; outside the
12 scope.

13 A. I don't know if that would have been the case.

14 Q. Would a person of ordinary skill in the art
15 been familiar with any one of those standards?

16 MR. SHAPIRO: Objection, form; objection,
17 outside the scope; objection relevance.

18 A. In reviewing the definition of a person of
19 ordinary skill in the art, I don't know that a person of
20 skill would have been aware of any one of these.

21 Q. In paragraph 147 of your declaration you
22 mention as relevant your opinion that 802.11(ac)
23 adopted estimating a channel response based upon a
24 perceived preamble sequence. Do you see that?

25 A. Yes, I do.

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 Q. Did 802.11 disclose preambles with training
2 sequences?

3 MR. SHAPIRO: Objection, form; outside
4 the scope; relevance.

5 A. I did not opine on this.

6 Q. Okay. I've just uploaded copy of 802.11-1999.
7 Please open that and let me know when you have it open?

8 MR. SHAPIRO: Is this a new Exhibit,
9 Brian.

10 MR. ERICKSON: This is the first one that
11 hasn't been marked yet. So Annette if we can mark this
12 as.

13 MR. SHAPIRO: Hold on. I can't see it.
14 I'm not able to see the exhibit.

15 MR. ERICKSON: Do you see it in the chat?

16 MR. SHAPIRO: I'm going to object to the
17 admissibility of this new exhibit which is, because it's
18 been belatedly presented without proper authorization,
19 has not been authenticated under Federal Rule of
20 Evidence 901; it's irrelevant under Federal Rule of
21 Evidence 401 and 402 because it hasn't been
22 authenticated and it's outside the scope and belatedly
23 presented, and also objecting because it's confusing and
24 waste of time, under Federal Rule of Evidence 403 and
25 under Federal Rule of Evidence 801 and 802 because it's

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 hearsay.

2 MR. ERICKSON: Okay. So Annette if we
3 can mark what's been uploaded as, I guess, Cooklev
4 Exhibit 1, please.

5 [Exhibit marked for identification as
6 Deposition Exhibit Number 1.)

7 MR. SHAPIRO: Annette, you heard all my
8 objections.

9 Q. (By Mr. Erickson) Dr. Cooklev, do you recognize
10 what's been marked as Cooklev Exhibit 1?

11 MR. SHAPIRO: Objection, outside the
12 scope; relevance.

13 A. I'm not sure that I do.

14 Q. Are you familiar with IEEE 802.11-1999
15 Standard?

16 MR. SHAPIRO: Objection; outside the
17 scope; irrelevant, and objection, form.

18 A. Generally, I'm familiar with IEEE 802.11. I
19 did not -- have not reviewed the 199 -- the 1999
20 standard in a very long time.

21 Q. Okay. All right. If you scroll down to
22 page 151, please.

23 A. (Complies.) As I said, I'm not sure that this
24 is -- that this document is the standard but I, at your
25 request I'm looking at page 151.

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 Q. Okay.

2 MR. SHAPIRO: Are we talking about 151 of
3 the file or the number, the native numbering?

4 MR. ERICKSON: Talking about the native
5 numbering, 151 in the lower right-hand corner.

6 MR. SHAPIRO: Okay. Hold on. Okay.

7 Q. (By Mr. Erickson) Dr. Cooklev, do you see
8 Section 14.3.2 PLCP frame format?

9 A. I see it as on the page that you, counsel,
10 asked me to look at.

11 Q. Okay. And do you see Figure 70 that includes
12 PLCP frame format with PLCP preamble, do you see that?

13 MR. SHAPIRO: Objection, outside the
14 scope; irrelevant, and are objection, form.

15 A. As I said, I do see Figure 70 here on the
16 following page.

17 Q. Okay. Does this refresh your recollection
18 about whether 802.11 defines a preamble sequence?

19 MR. SHAPIRO: Objection, form; outside
20 the scope; irrelevant.

21 A. Not quite because -- does this refresh my
22 recollection? Not, not quite because it's, it's been a
23 very, very long time that I've looked and studied
24 this -- I've studied something like that. So I think
25 that's what I can say.

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 Q. Okay. Do you have an opinion as to whether
2 802.11 defines a preamble sequence?

3 MR. SHAPIRO: Objection, form; outside
4 the scope; irrelevant.

5 A. Well, no, I don't have an opinion. And my, my
6 task was, above all, to respond to the declaration of
7 Dr. Wells, and I don't think even Dr. Wells identified
8 802.11 identified this a document like that, so I don't
9 have an opinion.

10 Q. I'm just uploaded another new exhibit. We'll
11 mark it Cooklev Exhibit 2.

12 [Exhibit marked for identification as
13 Deposition Exhibit Number 2.)

14 Q. Please let me know when you've opened it.

15 MR. SHAPIRO: Hold on. Okay. I'm going
16 to object to this new exhibit Cooklev Number 2. It's
17 inadmissible because it was belatedly presented without
18 proper authentication. It hasn't been properly
19 authenticated under Federal Rule of Evidence 901; it's
20 irrelevant under Federal Rule of Evidence 401 and 402
21 because it hasn't been authenticated, it is outside the
22 scope and belatedly presented. It's confusing or waste
23 of time under Federal Rule of Evidence 403, and it's
24 also not admissible under Federal Rules of Evidence 801
25 and 802 as hearsay.

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 Q. (By Mr. Erickson) Dr. Cooklev, do you recognize
2 what's been marked as Cooklev Exhibit 2?

3 MR. SHAPIRO: Objection, form.
4 Objection, outside the scope; irrelevant.

5 A. I'm not sure I can -- I've agreed -- I mean, I
6 see the document, but I'm not sure I agree.

7 Q. Are you familiar with 802.11(a)?

8 MR. SHAPIRO: Objection, form; objection,
9 outside the scope; objection, irrelevant.

10 A. Well, I feel as if you are asking me if I've
11 been aware, I mean I've yet awareness. It's been a -- a
12 very long time that I've looked at the standard, and as
13 far as this IPR I think even Dr. Wells is not, he's not
14 identified this.

15 But this 802.11(a) is -- this is --
16 there's no beamforming here and there's no transmitter
17 beamforming information, so this -- I think maybe this
18 is the reason why Dr. Wells even did not identify this
19 document.

20 Q. Okay. If you could turn to internal page 7,
21 PDF page 15 and let me know when you are there, please.

22 A. PDF 15, I'm there.

23 Q. You see in Section 17.3.2.1 subsection A?

24 A. 3.2.1.

25 Q. 17.3.2.1 overview of the PPDU encoding process.

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 Do you see that?

2 MR. SHAPIRO: Objection, outside the
3 scope and irrelevant.

4 A. I do.

5 Q. And you see in subsection A it discusses a PLCP
6 preamble field?

7 MR. SHAPIRO: Objection, outside the
8 scope and irrelevant.

9 A. I mean, I see these words.

10 Q. And the PLCP preamble field includes two
11 repetitions of long training sequence used for channel
12 estimation and fine frequency acquisition in the
13 receiver, do you see that?

14 MR. SHAPIRO: Objection, outside the
15 scope and relevance.

16 A. I see these words.

17 Q. Are you familiar with this portion of
18 802.11(a)?

19 MR. SHAPIRO: Objection, outside the
20 scope and relevance.

21 A. I said I haven't -- I'm not sure that this is
22 an accurate copy. I haven't reviewed 802.11(a) in a
23 very, very long time. And in any case it's, it's not a
24 document that is being identified by Dr. Wells. So if I
25 may say, why should I review this if it has not been

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 identified as relevant prior art.

2 Q. Do you have an opinion on whether 802.11(a)
3 defined a preamble sequence that included two training
4 sequences used for channel estimation?

5 MR. SHAPIRO: Objection, form; outside
6 the scope of Dr. Cooklev's direct testimony and
7 irrelevant.

8 A. I haven't analyzed 11(a) because even, Brian,
9 Dr. Wells he hasn't brought it up as relevant prior art,
10 and I can't, I can't right now form -- analyze, form an
11 opinion here. I need just to give this proper
12 consideration. But I said that probably Dr. Wells did
13 not bring it up because this has nothing to do with
14 beamforming.

15 Q. You were a part of IEEE during the
16 standardization process that resulted in 802.11(n),
17 correct?

18 MR. SHAPIRO: Objection, form; objection,
19 outside the scope and objection, relevance.

20 A. Yes, as I explained in my declaration, I was a
21 voting member of 802.11 between around 2005 to 2008.

22 Q. Did you ever vote on any of the proposals
23 related to 802.11(n)?

24 MR. SHAPIRO: Objection, form; outside
25 the scope, relevance.

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 A. I think I did.

2 Q. Were you part of task group N?

3 MR. SHAPIRO: Objection, form; objection
4 foundation; objection, outside the scope; objection
5 relevance.

6 A. I attended a number of 802.11(n) meetings.
7 Most of that time I was chair of a study group within
8 802.11, and so I was busier with my study group that
9 later became a task group, so obviously, I couldn't be
10 in, in more than one place, but I attended a number of
11 11(n) meetings and I attended the working group meetings
12 where votes, you know, were taken and decisions were
13 made.

14 Q. Were you aware of the WW1SE proposal made with
15 respect to 802.11(n)?

16 MR. SHAPIRO: Objection, form; objection,
17 foundation; objection, outside the scope, objection
18 relevance.

19 A. I mean, I have some -- I mean, rather vague but
20 I have some recollection of that.

21 Q. Do you recall a proposal by TGN Sync related to
22 802.11(n)?

23 MR. SHAPIRO: Objection, form; objection,
24 foundation; objection, outside the scope; objection,
25 relevance.

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 A. I have some of recognition, rather vague.

2 MR. SHAPIRO: Counsel it's been well over
3 an hour. Can we take a quick break.

4 MR. ERICKSON: I've only got like ten
5 more minutes. I'm happy to take a break if you want,
6 otherwise, we can push through.

7 MR. SHAPIRO: It's up to the witness.

8 MR. ERICKSON: Let's take a break. I can
9 tell from your slow response you need a break. Let's
10 take a break.

11 MR. SHAPIRO: Okay. Thanks. Thank you.

12 [Short break taken at 11:45 a.m.]

13 [Deposition resumed at 12:01 p.m.]

14 MR. ERICKSON: Doctor, I just uploaded
15 what we should mark as Cooklev Exhibit 3. Let me know
16 when you have that open.

17 [Exhibit marked for identification as
18 Deposition Exhibit Number 3.]

19 MR. SHAPIRO: Okay. I'm going to object
20 to this new Exhibit Cooklev 3. I'm going object -- I
21 object -- Patent Owner objects to the admissibility of
22 this exhibit because it's belatedly presented without
23 proper authorization from the Board under Rule
24 42.123(b). It has not been authenticated under Federal
25 Rule of Evidence 901. It's irrelevant under Federal

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 Rules of Evidence 401 and 402 because it's not
2 authenticated; outside the scope of Dr. Cooklev's
3 testimony, and belatedly presented without proper
4 authorization.

5 And Patent Owner further objects to the
6 admissibility because it is confusing or waste of time
7 under Federal Rule of Evidence 403, and because it's
8 hearsay under Federal Rule of Evidence 801 and 802.

9 Q. (By Mr. Erickson) Do you recognize what's been
10 marked as Cooklev Exhibit 3?

11 MR. SHAPIRO: Objection, form; objection,
12 relevance; outside the scope.

13 A. It's been many years since I've looked at
14 documents like this. I can't say that I recognize it.

15 Q. Did you ever vote on any proposal from WWiSE
16 related to 802.11(n)?

17 MR. SHAPIRO: Objection, form; objection,
18 relevance; outside the scope.

19 A. So you said did I vote on any proposal. I was
20 a voting member, as I said, between 2000 and 2002 and
21 then 2005 to 2008, and during that time I voted on what
22 I had to vote.

23 So I just -- again, the recollection is a
24 little vague, but there were some votes in which, which
25 were somewhat relevant. I can't say that I voted on

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 this document, that's what I think.

2 Q. Okay. If you will turn to PDF page 37 and let
3 me know when you are there, please.

4 A. PDF 37, I am there.

5 Q. Exhibit 3, PDF 37, Section 20.3.3 PLCP preamble
6 (SYNC). And if you look down at about line 24 it
7 states: The short sequence is followed by a long OFD
8 training sequence. Do you see that?

9 A. I do.

10 Q. Do you recall whether WWiSE ever proposed a
11 preamble sequence that included a long training
12 sequence?

13 MR. SHAPIRO: Objection, form; objection
14 relevance; outside the scope of direct testimony.

15 A. I can't recall right now specifics of the WWiSE
16 proposal.

17 MR. ERICKSON: All right. This should be
18 our last exhibit. I'm uploading what we can mark as
19 Cooklev Exhibit 4. If you could let me know when you
20 have it open.

21 (Exhibit marked for identification as
22 Deposition Exhibit Number 4.)

23 MR. SHAPIRO: I'm going to -- Patent
24 Owner is going to object to this new Exhibit 4, object
25 to the admissibility of the new exhibit because it's

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 belatedly presented without proper authorization; it's
2 not authenticated under Federal Rule of Evidence 901;
3 it's irrelevant under Federal Rule of Evidence under 401
4 and 402 because it's not authenticated, it's outside
5 scope of testimony and belatedly presented
6 without proper authorization. It is confusing or waste
7 of time under Federal Rule of Evidence 403 and because
8 its hearsay under Federal Rule of Evidence 801 and 802.

9 Q. (By Mr. Erickson) Dr. Cooklev, do you recognize
10 what's been marked as Exhibit 4?

11 MR. SHAPIRO: Objection, form; objection,
12 relevance; outside the scope of direct testimony.

13 A. I can't say that I recognize it. It's not a --
14 I recognize that it's not a document on which Dr. Wells
15 relies upon.

16 Q. Scroll down to page 94 of Exhibit 4. This time
17 it's both the internal and PDF page number ending from.

18 A. Ninety-four, I'm there.

19 Q. Okay. You see in Section 11.1.1.4 it describes
20 a HT PCLP preamble?

21 MR. SHAPIRO: Objection, relevance;
22 outside the scope of direct testimony.

23 Q. (By Mr. Erickson) Do you see that preamble
24 defined there, Dr. Cooklev?

25 MR. SHAPIRO: Objection, relevance;

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 outside the scope of direct testimony.

2 A. I see the words. I note that in the
3 previous -- one second. I think it was PLCP and here is
4 what PCLP.

5 Q. See on paragraph -- moving to page 95, lines
6 42, it describes after the AGC has been fine-tuned for
7 HT reception channel estimation and fine frequency
8 offset estimation are performed using the HT long
9 training symbols. Do you see that?

10 MR. SHAPIRO: Objection, relevance;
11 outside the scope of direct testimony.

12 A. Just a minute, counsel. I see page 95. I'm
13 not sure which part of 95.

14 Q. Passage I read was starting at line 42.

15 MR. SHAPIRO: Objection, irrelevant;
16 outside the scope, objection, form.

17 A. I mean, I do see line 42.

18 Q. Okay. Do you have an opinion as to whether the
19 TGN Sync proposal that is Exhibit 4 disclosed a preamble
20 sequence with multiple long training sequences?

21 MR. SHAPIRO: Objection, form; objection,
22 relevance; objection, outside the scope of direct
23 testimony.

24 A. I have not analyzed this document to be able to
25 answer your question like that. I need to consider it

TODOR COOKLEV, Ph.D. - September 18, 2024

Examination by Mr. Shapiro

1 and I know it wasn't even brought up by Dr. Wells.

2 Q. Okay.

3 MR. ERICKSON: Okay. I think that's all
4 the questions I have for you today, Dr. Cooklev, so I'll
5 pass the witness.

6 MR. SHAPIRO: Okay. Patent owner would
7 like take a break, let's say 20 minutes, so we can
8 decide whether we'd like to redirect the witness.

9 MR. ERICKSON: Okay.

10 THE COURT REPORTER: We're off the
11 record. Time is 12:14.

12 [Short break taken at 12:14 PM.]

13 THE COURT REPORTER: We're back on the
14 record 12:38 PM.

15 MR. SHAPIRO: Patent owner has couple of
16 questions on redirect for Dr. Cooklev.

17 EXAMINATION

18 BY MR. SHAPIRO:

19 Q. Dr. Cooklev, earlier in the deposition you were
20 asked by petitioner whether a matrix having elements
21 with real and imaginary components is produced in
22 Cartesian coordinates. Would you like to clarify your
23 answer in any way?

24 MR. ERICKSON: Objection, form.

25 A. Yes, I will try to do that. So what I

Todor Cooklev - September 18, 2024

Examination by Mr. Erickson

1 assumed -- well, I assumed counsel meant is the form
2 like A plus JB, the form of a complex number, A plus JB,
3 which, which is indeed in Cartesian coordinates;
4 however, that discussion was in the context of L1 748.
5 And if we look at L1 784, column 2, lines 59 through 61,
6 for example, we see two, two N square yield numbers for
7 any M by M complex unit 30 matrix.

8 And so this -- actually L1 784 these 2n
9 square yield numbers are not necessary -- do not
10 necessarily reflect that the matrix V is in Cartesian
11 coordinates.

12 Q. Dr. Cooklev, could you explain to me why?

13 A. Because L1 748 doesn't say that the elements of
14 V are in the form of A plus JB.

15 MR. SHAPIRO: Thank you, Dr. Cooklev.
16 That's all I have at this time.

17 REEXAMINATION

18 BY MR. ERICKSON:

19 Q. Dr. Cooklev, did you have any discussions with
20 counsel during the last break?

21 A. Yes, I did.

22 Q. And what do you discuss?

23 MR. SHAPIRO: Objection, that's
24 privileged. I'm directing the witness not to divulge
25 any, any information about the substance of our

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

1 discussion.

2 Q. (By Mr. Erickson) Are you going to follow that
3 instruction, Dr. Cooklev?

4 A. I will follow my counsel's advise.

5 MR. ERICKSON: Okay. No further
6 questions.

7 MR. SHAPIRO: The witness would like an
8 opportunity the review the transcript.

9 THE COURT REPORTER: Did you want a copy
10 of the transcript?

11 MR. SHAPIRO: Yeah, are you sending a
12 rough first? I'll take the rough also.

13 (Deposition concluded at 12:45 p.m.)

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1 THE STATE OF TEXAS §

2 COUNTY OF HIDALGO §

3 COURT REPORTER CERTIFICATE

4 I, ANNETTE E. ESCOBAR, Certified Shorthand
5 Reporter in and for the State of Texas, do hereby
6 certify that the facts as stated by me in the caption
7 hereto are true; that there came before me the
8 aforementioned named person, who was by me duly sworn to
9 testify the truth concerning the matters in controversy
10 in this cause; and that the examination was reduced to
11 writing by computer transcription under my supervision;
12 that the deposition is a true record of the testimony
13 given by the witness.

14 I further certify that I am neither attorney or
15 counsel for, related to or employed by, any of the
16 parties to the action in which this deposition is taken,
17 and, further, that I am not a relative or employee of
18 any attorney or counsel employed by the parties hereto,
19 or financially or otherwise interested in the action.

20 Pursuant to Rule 30(e)1:

21 XX Reading and Signing was requested.

22 _____ Reading and Signing was waived.

23 _____ Reading and signing was not requested.

24

25

Todor Cooklev - September 18, 2024
Examination by Mr. Erickson

Page 52

Given under my hand and seal of office on this
20th day of September, 2024.


ANNETTE L. ESCOBAR, CSR
TX CSR#5475, Exp: 1/31/26



Notice Date: Friday, 20. September 2024

Attention: Todor Cooklev, Ph.D.

Re:MediaTek Inc. v. Bell Northern Research, LLC
Deposition of Todor Cooklev, Ph.D. (9/18/2024)

NOTICE REGARDING SIGNING DEPOSITION TRANSCRIPT

The above referenced transcript is available for review. Within 30 days, or the applicable timeframe of your legal jurisdiction, the witness may read the testimony to verify its accuracy. Any changes can be noted on the following errata page.

Once the transcript has been reviewed, the witness should sign and date the certificate of deponent page. The signed certificate, errata, and original transcript (if provided) must be returned to TP.One per the rules of civil procedure.

If the transcript and errata are not returned within the allotted time, the unsigned transcript may be used as if signed by the witness.

Thank you,

TP.One Production Department
Production@tp.one



Deponent Errata Page

Notice Date: 09/20/2024

Deposition Date: 9/18/2024

Deponent: Todor Cooklev, Ph.D.

Case Name: MediaTek Inc. v. Bell Northern Research, LLC

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CERTIFICATE OF DEPONENT

I hereby certify that I have read and examined the foregoing transcript, and the same is a true and accurate record of the testimony given by me.

Any additions or corrections that I feel are necessary, I will attach on a separate sheet of paper to the original transcript.

Signature of Deponent

I hereby certify that the individual representing himself/herself to be the above-named individual, appeared before me this ____ day of _____, 20__, and executed the above certificate in my presence.

NOTARY PUBLIC IN AND FOR

County Name

MY COMMISSION EXPIRES:

<u>WORD INDEX</u>			
< § >	18 1:1, 13 2:1	14:1 15:1 16:1	37 45:2, 4, 5
§ 1:3, 4, 5, 6, 7,	3:1 4:1 5:1	17:1 18:1 19:1	38 3:15
8 51:1, 2	6:1 7:1 8:1	20:1 21:1 22:1	< 4 >
< 1 >	9:1 10:1 11:1	23:1 24:1 25:1	4 3:4, 15 45:19,
1 3:14 12:5	12:1 13:1 14:1	26:1 27:1 28:1	22, 24 46:10, 16
36:4, 6, 10	15:1 16:1 17:1	29:1 30:1 31:1	47:19
1/31/26 52:5	18:1 19:1 20:1	32:1 33:1 34:1	40 25:3, 6, 9
10:09 20:20	21:1 22:1 23:1	35:1 36:1 37:1	401 35:21
10:25 20:21	24:1 25:1 26:1	38:1 39:1 40:1	38:20 44:1 46:3
10:59 28:24	27:1 28:1 29:1	41:1 42:1 43:1	402 35:21
1001 3:21 5:12,	30:1 31:1 32:1	44:1 45:1 46:1	38:20 44:1 46:4
17, 24 6:9 12:5	33:1 34:1 35:1	47:1 48:1 49:1	403 35:24
1004 3:22 26:17	36:1 37:1 38:1	50:1 51:1 52:1,	38:23 44:7 46:7
1008 3:23 32:1	39:1 40:1 41:1	2	42 47:6, 14, 17
11(a) 41:8	42:1 43:1 44:1	20th 52:2	42.123(b) 43:24
11(ac) 34:22	45:1 46:1 47:1	24 6:1, 5, 6 45:6	43 3:15
11(n) 42:11	48:1 49:1 50:1	25 9:17	44 25:3, 6
11.1.1.4 46:19	51:1 52:1	26 3:22 28:9	45 3:15
11:00 28:25	18th 1:20	28 6:7, 20	47 11:11, 14, 22,
11:45 43:12	19806 2:10	28th 6:15	25 12:2
119 26:19, 22	199 36:19	29 8:24	48 3:5 12:16,
12:01 43:13	1999 36:19	2n 49:8	20, 25 13:2, 7,
12:14 48:11, 12	< 2 >	< 3 >	20 14:13, 19, 23,
12:38 48:14	2 3:15 38:11,	3 3:15 28:11	25 15:17 16:5
12:45 1:21	13, 16 39:2 49:5	43:15, 18, 20	17:11 34:3
50:13	20 13:11 48:7	44:10 45:5	49 3:6 27:16,
13 25:3, 6, 8	20.3.3 45:5	3.2.1 39:24	20 28:7
14 13:10	2000 44:20	30 8:6, 24 49:7	< 5 >
14.3.2 37:8	2001 5:14 6:1	30(e)1 51:20	5 3:21
147 34:21	21:1	3000 2:4	50 3:7 28:19
15 39:21, 22	2002 44:20	302.353.4251	512.457.7000 2:5
151 36:22, 25	2005 6:7, 15, 20	2:11	512.721.2263 2:6
37:2, 5	41:21 44:21	302.449.9010	53 3:8
1526 2:10	2008 41:21	2:11	54 3:9
17 32:9	44:21	303 2:4	5475 4:6
17.3.2.1 39:23,	2024 1:1, 13, 20	31 33:23	59 49:5
25	2:1 3:1 4:1	32 3:23	< 6 >
1700 28:2	5:1 6:1 7:1	35 28:11	
	8:1 9:1 10:1	36 3:14	
	11:1 12:1 13:1		

60 6:11 7:20 61 49:5 63 6:11, 21, 24 7:13 65 15:6, 21 69 16:16 17:20 19:13, 24 < 7 > 7 39:20 70 21:2 23:5 37:11, 15 71 23:7, 10, 20 25:2 714 32:7, 10, 12 7236748 3:22 748 3:22 26:15, 16 49:4, 13 784 27:1, 4 49:5, 8 78701-4653 2:5 < 8 > 8,416,862 1:6 801 35:25 38:24 44:8 46:8 802 34:22 35:25 38:25 44:8 46:8 802.11 33:23 35:1 36:18 37:18 38:2, 8 41:21 42:8 802.11(a) 33:24 39:7, 15 40:18, 22 41:2 802.11(b) 33:24 802.11(g) 33:24 802.11(n) 34:3 41:16, 23 42:6, 15, 22 44:16	802.11-1999 35:6 36:14 802.11a-1999 3:14, 15 826 25:1 8416862 3:21 862 5:12 6:9, 14, 24 7:13, 15, 21, 22 8:10 9:2, 11 11:15, 21 14:5 17:12 23:9 25:2, 5, 8 28:8 29:2 33:7, 22, 23 < 9 > 9 34:2 9:07 1:21 4:3 901 35:20 38:19 43:25 46:2 94 46:16 95 47:5, 12, 13 < A > a.m 1:21 4:3 28:24, 25 43:12 able 35:14 47:24 above-styled 1:19 abstract 31:5, 7 accomplish 10:3 accomplished 14:1 accurate 28:5 40:22 accurately 21:11 acquisition 40:12	action 51:16, 19 add 10:6 25:19 adds 24:9 33:8 34:3 administering 4:7 admissibility 35:17 43:21 44:6 45:25 admissible 38:24 adopt 8:13, 14 adopted 8:17 34:23 advanced 8:22 advantageously 14:1 advantages 12:18, 24 13:6, 19 advise 50:4 aforementioned 51:8 AGC 47:6 agree 18:4, 21 19:2, 12 29:23 39:6 agreed 39:5 agreement 19:14 algebra 8:22, 23 9:1, 11, 25 10:7, 11, 15, 22 11:8 ambiguous 18:19, 20 amount 27:22 analysis 30:22, 23 analyze 6:21 29:24, 25 41:10 analyzed 7:12, 19 31:4 41:8 47:24	Annette 1:21 4:6 35:11 36:2, 7 51:4 52:4 answer 12:9, 14 15:25 25:20 29:19 31:5 32:21 33:11 47:25 48:23 answered 8:3 antennas 21:23 22:1, 6, 15, 20 APPEAL 1:1 APPEARANCES 2:1 4:12 application 5:4 6:23 7:12 applications 5:3, 6 7:20 Array 3:24 art 8:10, 18 9:1, 5, 7, 10, 15, 18, 19, 21 10:10, 14, 18 11:4, 5, 8 17:16 24:13 25:12, 14 27:8 28:12 30:5, 8, 15, 23 31:6, 10, 12, 17 34:9, 14, 19 41:1, 9 asked 6:18, 22 7:18, 25 8:3, 4, 5 25:20 37:10 48:20 asking 9:4 39:10 asserted 11:1 associated 11:18 18:19 28:14 assumed 49:1 attached 1:25
---	--	--	--

attended 42:6, 10, 11 ATTORNEY 2:2, 8 51:14, 18 Austin 2:5 authenticated 35:19, 22 38:19, 21 43:24 44:2 46:2, 4 authentication 38:18 authorization 35:18 43:23 44:4 46:1, 6 Avenue 2:10 aware 24:18, 21 34:10, 20 39:11 42:14 awareness 39:11 < B > bachelor's 8:19, 23 10:8 11:3, 9 back 15:16 17:11 20:21 21:1 27:15 28:25 33:22 48:13 based 26:8 30:2 31:2, 3 34:23 Basically 8:4 basis 12:1, 23 13:5, 18 beam 30:7 beamformer 21:23 22:13, 18 beamforming 27:22 28:21 29:9, 13 30:1,	10, 17 39:16, 17 41:14 Beginning 5:25 13:23 16:17, 19 17:21 18:10, 13 19:3, 5, 8, 15 20:5, 7, 10 24:5 25:8 28:9, 11 belatedly 35:18, 22 38:17, 22 43:22 44:3 46:1, 5 BELL 1:6 4:17 better 12:14 16:8 32:21 beyond 10:7 11:2, 5, 9 29:21 bit 28:18 bits 12:11 18:1, 5, 14 21:14, 17, 18 28:2, 4, 6 BOARD 1:1 43:23 Board's 8:14 10:18 bottom 32:11 break 20:12, 13, 17, 20, 24 28:24 43:3, 5, 8, 9, 10, 12 48:7, 12 49:20 Brent 3:24 Brian 2:3 4:13 35:9 41:8 brian.erickson@us.dlapiper.com 2:6 bring 41:13 brought 41:9 48:1	busier 42:8 < C > calculated 28:1 called 21:10 26:6, 9, 12 caption 51:6 carriers 14:20 15:1, 4, 18 16:2, 18, 20, 24 17:1, 2 Cartesian 26:21 27:2, 9, 13, 18 28:13 29:9, 15 30:12, 18 31:14, 19 48:22 49:3, 10 CASE 1:5 5:8, 23 17:5 19:21 34:13 40:23 cases 16:21 20:8 cause 1:20 51:10 CERTIFICATE 51:3 Certified 1:22 51:4 certify 51:6, 14 chair 42:7 channel 11:18 13:13, 16 14:8 25:9 27:24 34:23 40:11 41:4 47:7 chat 5:11 26:17 32:1, 5 35:15 Cheruvu 4:17 citation 11:25 cite 11:21 25:2	claim 23:18 25:25 29:1, 4, 7, 15, 20 30:3, 5, 9, 15 31:20, 22 33:7, 8, 11 claimed 18:23 claims 6:7, 11 7:15, 22 23:22 clarify 48:22 clause 19:3 clean 5:10 clear 16:4 clearly 19:13 29:20 closed 5:5 colleague 4:16 Colorado 2:4 column 13:10 25:3, 6, 8 28:11 33:22 34:2, 5, 6 49:5 come 14:18 31:11 comes 14:16 comment 8:14 communication 13:12 compare 26:2 comparing 25:10, 15 comparison 32:21 33:6 complete 5:1 12:9 33:16 complex 10:12, 16, 23 27:5, 25 49:2, 7 complexity 14:7, 11 Complies 36:23
---	--	---	---

components 28:5 48:21 composition 33:9 comprises 33:9, 12 computations 3:23 computer 5:4 51:11 computerized 1:23 computing 33:16 concept 9:15 concepts 9:1, 11 concern 12:12, 13 concerning 51:9 conclude 14:25 concluded 3:7 50:13 confirmed 5:17 confusing 35:23 38:22 44:6 46:6 consider 33:6 47:25 consideration 41:12 considered 22:12 consist 20:2, 6 consistent 23:8 25:23 consists 21:14 constitutes 23:13 construction 23:19 contain 18:13, 16	containing 14:20 15:1, 5, 18 16:2 24:6 context 25:1 49:4 continuing 19:9 continuous 18:1, 5 contradiction 15:23 controversy 51:9 COOKLEV 1:1, 12, 17 2:1 3:1, 3 4:1, 19, 23 5:1 6:1 7:1 8:1 9:1 10:1 11:1 12:1 13:1 14:1 15:1 16:1 17:1 18:1 19:1 20:1, 14, 22 21:1 22:1 23:1 24:1 25:1 26:1 27:1 28:1 29:1 30:1 31:1 32:1 33:1 34:1 35:1 36:1, 3, 9, 10 37:1, 7 38:1, 11, 16 39:1, 2 40:1 41:1 42:1 43:1, 15, 20 44:1, 10 45:1, 19 46:1, 9, 24 47:1 48:1, 4, 16, 19 49:1, 12, 15, 19 50:1, 3 51:1 52:1 Cooklev's 41:6 44:2 coordinate 31:14 coordinates 26:21 27:2, 9, 10, 13, 18 28:13	29:10, 14, 15 30:11, 12, 17, 19 31:13, 18 48:22 49:3, 11 copy 5:10, 12, 13 35:6 40:22 50:9 corner 37:5 correct 5:14, 15 11:7, 23 17:4 18:6 19:19 25:13 27:2 28:10, 15 29:16 41:17 corresponding 25:11, 16 26:3 Counsel 4:11 8:7 9:16 16:9 20:11 22:22 28:22 31:3 32:20 37:9 43:2 47:12 49:1, 20 51:15, 18 counsel's 50:4 COUNTY 51:2 couple 48:15 COURT 4:5 28:22 48:10, 13 50:9 51:3 cover 6:10, 14, 24 7:13, 20 CSR 4:6 52:4 CSR#5475 52:5 < D > data 11:17 12:11 14:20 15:1, 2, 4, 5, 18 16:2, 18, 20, 21, 24 17:1, 5, 13	date 6:15, 19, 20, 21 dates 6:14 day 1:20 16:23 52:2 DE 2:10 decide 48:8 decides 33:12 decisions 42:12 declaration 5:10, 13, 21 6:1, 3, 19 8:6, 12 11:11 12:16 13:20 14:25 15:7 17:15, 20 21:1 22:25 24:20, 22 26:20 27:15 34:21 38:6 41:20 Decomposition 3:23 33:12 define 18:2 defined 10:1, 2 41:3 46:24 defines 37:18 38:2 definition 8:14, 17 9:21, 23 10:18, 21 19:4, 9 23:14 34:18 degree 8:19, 23 10:8 11:3, 10 dense 33:17 depends 33:8 DEPOSITION 1:1, 11, 17 2:1 3:1, 7 4:7 12:6 36:6 38:13 43:13, 18 45:22 48:19 50:13
---	--	---	--

51:12, 16 describe 32:15 described 9:2, 11 32:25 describes 46:19 47:6 DESCRIPTION 3:13 determine 7:14, 21 device 13:12, 13 29:8 30:1, 6, 9, 16 devices 29:13 DEVLIN 2:9 4:16 difference 32:15 different 22:1 23:2 33:20 difficult 31:2, 4 direct 41:6 45:14 46:12, 22 47:1, 11, 22 directed 22:23 directing 49:24 disagree 15:24 disclaimer 24:13, 18, 21 disclose 35:1 disclosed 27:1 47:19 discloses 30:6, 9, 15 32:6 disclosing 30:18 disclosure 30:25 31:10 32:7 disclosures 23:9 discuss 13:6, 19 17:12 20:22 27:16 49:22	discusses 33:23 40:5 discussion 23:10 49:4 50:1 discussions 49:19 divulge 49:24 DLA 2:4 4:14 Doctor 43:14 document 36:24 38:8 39:6, 19 40:24 45:1 46:14 47:24 documents 44:14 downloaded 5:17 32:4 Dr 4:23 20:14, 22 29:1 36:9 37:7 38:7 39:1, 13, 18 40:24 41:6, 9, 12 44:2 46:9, 14, 24 48:1, 4, 16, 19 49:12, 15, 19 50:3 drag 5:11 drawn 28:8 duly 1:19 4:20 51:8 < E > earlier 18:15 25:20 48:19 education 8:16 10:20 efficiency 12:12 14:7, 12 efficient 14:8 either 7:19, 21 electrical 8:19	elements 10:12, 16, 23 27:5, 6, 25 48:20 49:13 E-mail 2:6, 12 5:5 employed 51:15, 18 employee 51:17 encoding 39:25 engineering 8:20 entire 21:11 entitled 14:7 Erickson 2:3 3:4, 6 4:1, 13, 14, 22 5:1 6:1 7:1, 5 8:1 9:1 10:1 11:1 12:1 13:1 14:1 15:1, 16 16:1 17:1, 11 18:1 19:1, 2 20:1, 13, 18, 22 21:1 22:1 23:1 24:1 25:1 26:1 27:1 28:1 29:1 30:1, 14 31:1 32:1 33:1 34:1 35:1, 10, 15 36:1, 2, 9 37:1, 4, 7 38:1 39:1 40:1 41:1 42:1 43:1, 4, 8, 14 44:1, 9 45:1, 17 46:1, 9, 23 47:1 48:3, 9, 24 49:1, 18 50:1, 2, 5 51:1 52:1 Errata 3:8 error 26:9 Escobar 1:21 4:6 51:4 52:4	established 18:15 establishes 27:4 estimated 29:8, 13 30:1, 7, 10, 16 estimating 13:13 25:9 34:23 estimation 11:19 13:16 40:12 41:4 47:7, 8 Evidence 1:24 35:20, 21, 24, 25 38:19, 20, 23, 24 43:25 44:1, 7, 8 46:2, 3, 7, 8 Examination 3:4, 5 4:1, 21 5:1 6:1 7:1 8:1 9:1 10:1 11:1 12:1 13:1 14:1 15:1 16:1 17:1 18:1 19:1 20:1 21:1 22:1 23:1 24:1 25:1 26:1 27:1 28:1 29:1 30:1 31:1 32:1 33:1 34:1 35:1 36:1 37:1 38:1 39:1 40:1 41:1 42:1 43:1 44:1 45:1 46:1 47:1 48:1, 17 49:1 50:1 51:1, 10 52:1 example 13:10 26:6 27:21 28:7, 19 32:25 33:18 49:6 Excuse 14:23
---	---	---	--

EXHIBIT 3:13 5:12, 14, 17, 24 6:1, 9 12:5 21:1 26:17 32:1 35:8, 14, 17 36:4, 5, 6, 10 38:10, 11, 12, 13, 16 39:2 43:15, 17, 18, 20, 22 44:10 45:5, 18, 19, 21, 22, 24, 25 46:10, 16 47:19 EXHIBITS 3:11, 20 Exp 52:5 expected 24:6 25:11, 16 26:3 experience 8:16 10:19 explain 17:24 49:12 explained 9:16 27:20 33:2 41:20 explaining 24:24 25:24 extent 8:15 23:18 24:2 32:23 33:10 < F > facts 51:6 fair 26:25 27:18 fairly 8:21 10:20 familiar 23:17 31:23, 25 34:15 36:14, 18 39:7 40:17 far 7:9, 10	32:21 39:13 Fax 2:6, 11 Federal 1:24 35:19, 20, 24, 25 38:19, 20, 23, 24 43:24, 25 44:7, 8 46:2, 3, 7, 8 feedback 14:8 27:17, 22, 25 28:1, 3, 12, 15 feel 39:10 field 40:6, 10 Figure 37:11, 15 file 7:10 37:3 finally 12:19 financially 51:19 find 16:15 fine 20:7, 16 40:12 47:7 fine-tuned 47:6 finish 24:8 finished 12:21 FIRM 2:9 4:14, 16 first 4:20 9:13, 14 10:17 11:14 12:18 13:25 14:19, 23, 24 15:20 16:13 18:4, 7 21:16 25:19 29:2, 14, 19 30:11, 18 31:14, 19 33:14 35:10 50:12 five 33:8 follow 50:2, 4 followed 17:2, 6 19:18, 22, 25 20:1, 6, 8 45:7 following 37:16	follows 4:20 forcing 26:7 form 6:16 7:1, 7, 16, 23 8:2, 11 9:3, 12 10:13 11:6, 24 12:3 13:1, 8, 21 14:4, 15, 22 15:15 16:7 17:3, 9, 14 18:3, 24 19:6, 20 21:15 22:3, 11, 17 23:4, 16 24:15 25:17 27:3, 11, 19 28:16 29:17 30:20 32:18 34:16 35:3 36:17 37:14, 19 38:3 39:3, 8 41:5, 10, 18, 24 42:3, 16, 23 44:11, 17 45:13 46:11 47:16, 21 48:24 49:1, 2, 14 format 37:8, 12 Fort 4:9 Forty-eight 34:7 foundation 42:4, 17, 24 four 28:4 frame 37:8, 12 frequency 40:12 47:7 full 5:1 fully 25:23 further 44:5 50:5 51:14, 17 < G > gears 26:14	general 12:10 15:10 generally 8:24 10:8 11:2, 9 12:12 14:5 26:4, 12 30:22 36:18 generative 12:11 generator 26:20 getting 34:5 Gilpin 2:10 give 12:9, 14 32:21 33:6 41:11 Given 3:24 31:23 51:13 52:1 Givens 31:21, 25 32:16, 22, 24 33:3, 9, 12 go 20:18 25:5 26:14 28:23 goes 10:7 going 5:11 15:16 17:11 20:14 26:14 27:15 33:22 35:16 38:15 43:19, 20 45:23, 24 50:2 Good 4:5, 23, 24 Great 5:16, 18, 20 32:15 group 42:2, 7, 8, 9, 11 Gs 27:14 guess 36:3 < H > Hac 2:3
--	---	---	--

hand 52:1 handy 26:18 happy 20:13 43:5 hate 28:22 heard 36:7 hearsay 36:1 38:25 44:8 46:8 helpful 5:23 hereto 1:25 51:7, 18 HIDALGO 51:2 history 7:10 Hold 35:13 37:6 38:15 hour 20:12 43:3 HT 46:20 47:7, 8 hypothetical 9:18 22:24 31:8 < I > identification 36:5 38:12 43:17 45:21 identified 6:24 7:13, 20 38:7, 8 39:14 40:24 41:1 identifies 12:18 identify 12:17 26:20 39:18 IEEE 3:14, 15 36:14, 18 41:15 illustrate 27:21 imaginary 27:7, 12 28:5 48:21 impacted 13:17 implementations 33:3 important 9:22	improving 14:7, 10, 11 inadmissible 38:17 include 21:9, 18 included 41:3 45:11 includes 21:17 25:9 29:7 37:11 40:10 including 32:7 increase 11:17 28:6 INDEX 3:1 Indiana 4:10 information 14:8 15:11 24:6 27:18, 23 28:21 39:17 49:25 infringement 22:23 29:21 30:24 instance 1:18 instruction 17:8 22:2 50:3 interactive 33:1 interested 51:19 internal 39:20 46:17 interspersed 11:17 intrinsic 23:13 24:12, 19 invention 8:19 9:20 14:5, 6 28:20 inventors 11:15 12:17, 24 13:6, 19 27:17 28:13,	20 investigate 32:20 involved 8:22 IPR 29:22 39:13 IPR2023-01414 1:5 irrelevant 6:17 35:20 36:17 37:14, 20 38:4, 20 39:4, 9 40:3, 8 41:7 43:25 46:3 47:15 its 46:8 < J > Jacobi 32:6, 16, 22, 24 33:18, 20 Jason 2:9 4:15 JB 49:2, 14 jshapiro@devlinl awfirm.com 2:12 June 6:7, 15, 20 < K > keep 20:14 keeping 15:20 16:20 kind 8:22 know 8:21 11:12 12:20 21:2 24:17 29:2 32:2 34:13, 19 35:7 38:14 39:21 42:12 43:15 45:3, 19 48:1 knowledge 11:3 known 9:19 24:6, 7 25:12,	14 26:2, 6, 13 28:12 31:13, 18 knows 10:9 11:10 < L > LANs 3:15 LAW 2:9 4:14, 16 lawyer 9:14 23:19 legal 23:18 level 8:8 11:5 lexicography 23:13, 17 24:3 Li 3:22 26:15, 16 27:1, 4 49:4, 5, 8, 13 likelihood 26:12 limitation 29:7, 10 limited 32:24 line 6:20 13:11 25:3, 9 28:9, 11 33:22 34:3, 5 45:6 47:14, 17 lines 25:6 47:5 49:5 list 6:19 lists 33:20 34:2, 3 little 28:18 44:24 LLC 1:7 LLP 2:4 load 14:20 15:2, 5, 18 16:2 17:13 18:14, 16, 20 located 4:9 LONEY 2:3
--	--	---	---

long 12:22 28:18 36:20 37:23 39:12 40:11, 23 45:7, 11 47:8, 20 look 6:9 30:25 31:9 32:11 33:14 37:10 45:6 49:5 looked 7:4 13:2 37:23 39:12 44:13 looking 6:5 8:7 13:3 15:3, 8 29:6 32:4, 14 36:25 lower 37:5 Luk 3:24 < M > machine 1:23 mark 35:11 36:3 38:11 43:15 45:18 MARKED 3:20 5:14 6:11 35:11 36:5, 10 38:12 39:2 43:17 44:10 45:21 46:10 materials 5:7 math 8:22 9:25 10:21 11:1 matrices 10:23 26:20 27:14 33:18 matrix 9:1, 10, 25 10:7, 11, 15, 22 11:8 27:1, 5 29:9, 14 30:2,	11, 17 48:20 49:7, 10 matter 4:18 15:10 matters 51:9 maximum 26:12 mean 15:19 16:1, 6, 13, 22 17:24 19:4 24:19, 25 26:9 32:25 39:5, 11 40:9 42:19 47:17 meaning 16:14 19:23 24:14 meanings 23:7, 24 meant 49:1 MEDIATEK 1:3 meetings 42:6, 11 member 41:21 44:20 mention 34:22 mentions 33:23 method 32:7, 16, 22, 24 33:18, 19, 20, 21 methods 32:6 33:16 mind 14:17 15:20 minimum 26:9 minus 27:23 minute 47:12 minutes 43:5 48:7 MMSE 26:9 moment 12:19 morning 4:5, 23, 24 5:1	Moving 11:11 17:20 47:5 multiple 22:14, 19 47:20 < N > name 4:6 named 51:8 native 37:3, 4 necessarily 49:10 necessary 49:9 need 28:14 32:20 33:5 41:11 43:9 47:25 neither 51:14 new 35:8, 17 38:10, 16 43:20 45:24, 25 nine 34:2, 5, 6 Ninety-four 46:18 noise 13:17 NORTHERN 1:6 4:18 note 6:6 15:9, 10 47:2 number 12:11 22:6 25:12 28:6 36:6 37:3 38:13, 16 42:6, 10 43:18 45:22 46:17 49:2 numbered 1:20 numbering 37:3, 5 numbers 32:11 49:6, 9 numerically	33:16 NXP 1:3 < O > oath 4:7 object 35:16 38:16 43:19, 20, 21 45:24 objecting 35:23 Objection 6:16 7:1, 7, 16, 23 8:2, 11 9:3, 12 10:13 11:6, 24 12:3 13:1, 8, 21 14:4, 15, 22 15:15 16:7 17:3, 9, 14 18:3, 24 19:6, 20 21:15 22:3, 11, 17 23:4, 15 24:15 25:17 27:3, 11, 19 28:16 29:17 30:20 31:15 32:18 34:11, 16, 17 35:3 36:11, 16, 17 37:13, 14, 19 38:3 39:3, 4, 8, 9 40:2, 7, 14, 19 41:5, 18, 19, 24 42:3, 4, 16, 17, 23, 24 44:11, 17 45:13 46:11, 21, 25 47:10, 15, 16, 21, 22 48:24 49:23 objections 36:8 objective 26:10 objects 43:21 44:5
--	---	--	--

obviously 42:9 ODF 18:8, 9 OFD 45:7 OFFICE 1:1 33:1 52:1 offset 47:8 Oh 16:8 34:8 Okay 4:15 5:7, 11, 16, 24, 25 6:6 15:16 20:3, 18 21:5 25:5 26:25 29:7 35:6 36:2, 21 37:1, 6, 11, 17 38:1, 15 39:20 43:11, 19 45:2 46:19 47:18 48:2, 3, 6, 9 50:5 open 5:6, 20, 22 26:18 32:2, 3 35:7 43:16 45:20 opened 5:24 38:14 opine 23:7 35:5 opined 22:25 31:19 opinion 6:18 8:8, 25 9:6, 9 10:5 11:4 12:1, 23 13:5, 18 16:25 17:1 19:17 21:8 22:9, 13 23:1, 12, 19 24:11 26:19 27:1 29:12 30:3, 8, 14 31:1, 11 34:22 38:1, 5, 9 41:2, 11 47:18 opinions 26:15	opportunity 50:8 ORAL 1:1, 11, 17 2:1 3:1 4:8 ordinary 8:9, 15, 18, 25 9:4, 6, 10, 15, 17, 21 10:10, 14, 17 11:5 17:16 19:23 23:24 24:12 27:8 31:12, 17 34:9, 14, 19 outlined 12:24 outside 6:17 7:2, 8, 17, 24 8:3 24:15 25:17 28:16 29:17 30:20 31:15 32:18 34:11, 17 35:3, 22 36:11, 16 37:13, 19 38:3, 21 39:4, 9 40:2, 7, 14, 19 41:5, 19, 24 42:4, 17 44:2, 12, 18 45:14 46:4, 12, 22 47:1, 11, 16, 22 outsides 42:24 overhead 11:18 12:13 14:6 28:14 overview 39:25 Owner 1:8 2:8 4:17 43:21 44:5 45:24 48:6, 15 < P >	p.m 1:21 43:13 50:13 P802.11 3:15 packet 15:10, 11 18:1, 18, 19 PAGE 3:2, 13 32:7, 9, 10, 11, 12, 13 33:14 36:22, 25 37:9, 16 39:20, 21 45:2 46:16, 17 47:5, 12 paragraph 6:1, 5, 6, 20, 24 7:13, 20 8:6 9:17 11:11, 14, 22, 25 12:1, 16, 18, 20, 22, 25 13:2, 3, 7, 20 14:13, 25 15:6, 17, 21 16:5, 15, 16 17:11, 20 19:13, 24 21:2 23:5, 7, 10, 20 25:2 26:19, 22 27:16, 20 28:7, 8, 19 33:15 34:21 47:5 paragraphs 6:11 8:24 24:23, 24 parallel 33:2 part 7:9 25:22 27:6, 7 41:15 42:2 47:13 parties 51:16, 18 parts 27:12 pass 48:5 Passage 47:14 PATENT 1:1, 6, 8 2:8 3:21, 22	4:17 5:12, 22 6:6, 10, 14, 25 7:14, 15, 21, 22 8:10 9:2, 11 11:15, 21 12:7, 10 14:10 17:12 23:9, 21 25:1, 2, 5, 8 28:8 29:2 33:7, 22, 23 43:21 44:5 45:23 48:6, 15 patents 24:4 pause 30:13 pay 14:20 15:2, 5, 18 16:2 17:13 18:14, 16, 19 PCLP 46:20 47:4 PDF 26:16 39:21, 22 45:2, 4, 5 46:17 perceived 34:24 performed 47:8 performing 10:11 11:18 person 8:9, 14, 18, 25 9:4, 6, 9, 15, 17, 18, 21, 24 10:8, 10, 14, 17 11:9 13:14, 24 14:9 17:16, 17 18:8 21:20 23:21 24:4, 12, 24 25:24 27:8 31:12, 17 34:9, 14, 18, 19 51:8 perspective 17:15
---	--	--	--

Petitioner 1:4, 18 2:2 4:12, 13 48:20 Ph.D 1:1, 12, 17 2:1 3:1 4:19 48:1 phrase 14:25 15:2 physical 5:13 PIPER 2:4 4:14 place 15:3 42:10 plain 19:23 23:23 PLCP 37:8, 12 40:5, 10 45:5 47:3 please 4:11 6:2 11:12 21:2 29:5 35:7 36:4, 22 38:14 39:21 45:3 plus 49:2, 14 PM 48:12, 14 polar 27:9 29:14 30:11, 17 31:13, 18 portion 11:21 15:21 20:5, 10 40:17 possible 15:23 PPDU 39:25 practiced 29:16, 20 30:4 preamble 13:10, 12, 14, 16, 23 14:2 15:12 16:14, 16, 25 17:2, 6, 7, 17 18:22, 23 19:4, 16, 17 20:3	21:5, 8, 11, 19, 22 22:7 23:8, 24, 25 24:5, 9, 10, 14, 25 25:10, 15, 22, 25 26:3 34:24 37:12, 18 38:2 40:6, 10 41:3 45:5, 11 46:20, 23 47:19 preambles 35:1 precise 24:17 presented 35:18, 23 38:17, 22 43:22 44:3 46:1, 5 presumed 9:18 prevent 4:25 previous 47:3 PREVIOUSLY 3:20 prior 11:1, 4, 8 14:19 15:1, 4, 17 16:1, 5, 6, 10, 12, 17, 19 30:5, 8, 15, 23 31:6, 10 41:1, 9 priority 6:7, 11, 15, 19, 21 24:7 privileged 49:24 Pro 2:3 probably 41:12 problem 15:20 27:16, 22 procedure 33:1 P-R-O-C-E-E-D-I-N-G-S 4:1 process 14:12 30:2 39:25 41:16 processing 26:5	produce 31:13, 18 produced 1:18 30:18 48:21 produces 29:13 30:6, 10, 16 producing 29:8, 15 30:1, 11 31:14, 19 proper 33:6 35:18 38:18 41:11 43:23 44:3 46:1, 6 properly 29:24 33:5 38:18 property 33:2 Proposal 3:15, 18 42:14, 21 44:15, 19 45:16 47:19 proposals 41:22 proposed 22:2 45:10 provide 6:18 23:19 28:12 30:3 31:1 provided 26:16 providing 5:1 19:24 27:17 provisions 1:25 purpose 30:24 pursuant 1:24 51:20 push 43:6 put 26:17 < Q > QR 33:8, 12, 18, 20 qualification 10:19	question 9:8, 14 16:1, 9 17:19 21:7 22:5, 18, 22, 24 24:2, 17 26:1 28:18 29:19, 21 31:4, 5, 8 32:23 47:25 questions 5:21 48:4, 16 50:6 quick 20:12 43:3 quickly 12:7 13:3 quite 37:21, 22 < R > RDM 12:11 read 47:14 reading 23:21 24:4 51:21, 22, 23 ready 5:23 real 27:6, 12 28:4 48:21 reason 39:18 recall 6:23 7:3, 5 42:21 45:10, 15 received 25:10, 15 26:2 receiver 24:7 40:13 receiving 13:11, 12 29:8, 12, 25 30:6, 9, 15 reception 47:7 recites 12:10, 11 13:10 recognition 43:1 recognize 11:15 12:17 13:6, 19
--	--	---	--

24:13 28:13 36:9 39:1 44:9, 14 46:9, 13, 14 recognized 12:24 13:15, 24 14:10 27:17 recollection 37:17, 22 42:20 44:23 record 1:25 12:4 20:19, 21 23:13 24:12, 19 28:23, 25 48:11, 14 51:12 redirect 48:8, 16 reduce 28:14, 20 reduced 51:10 Reducing 3:23 14:6, 11 Reexamination 3:6 49:17 reference 26:15, 16 28:7 32:2 references 11:1, 8 referring 17:23, 25 reflect 49:10 refresh 37:17, 21 regarding 30:22 relate 5:21 related 5:7 16:14 23:18 24:13 26:15 27:17 41:23 42:21 44:16 51:15 relationship 17:12 relative 51:17	relevance 7:2, 7, 16, 23 8:2 22:4, 11, 17 23:4 24:16 29:18 32:19 34:17 35:4 36:12 40:15, 20 41:19, 25 42:5, 18, 25 44:12, 18 45:14 46:12, 21, 25 47:10, 22 relevant 9:19 22:7 34:22 41:1, 9 44:25 relies 46:15 remainder 19:18 REMOTE 1:1, 11, 17 2:1 3:1 Remotely 1:14, 24 4:8 repetitions 40:11 Reported 1:14, 23 Reporter 1:22 4:5 28:22 48:10, 13 50:9 51:3, 5 reporting 4:7 represent 4:17 request 36:25 requested 51:21, 23 require 8:23 requirement 22:15 requires 19:24 RESEARCH 1:6 4:18 respect 42:15 respond 38:6	response 13:14 17:19 25:9 34:23 43:9 restart 30:7 restate 9:8 resulted 41:16 resumed 43:13 review 12:20 40:25 50:8 reviewed 12:7 13:2 36:19 40:22 reviewing 12:4, 15 34:18 reworded 19:4 right 5:25 14:17 16:23 24:21 28:9, 10 32:13 36:21 41:10 45:15, 17 right-hand 37:5 rotation 31:21, 23, 25 32:16, 22, 24 33:3, 4, 9, 13 rough 50:12 Rule 35:19, 20, 24, 25 38:19, 20, 23 43:23, 25 44:7, 8 46:2, 3, 7, 8 51:20 Rules 1:24 38:24 44:1 < S > satisfy 30:15 satisfy 22:15 30:5, 8 saying 19:7 23:20 says 13:11	33:15 Scan 31:20 scope 6:17 7:2, 8, 17, 24 8:3 18:23 19:1 24:16 25:18 28:17 29:18, 21 30:21 31:16 32:19 34:12, 17 35:4, 22 36:12, 17 37:14, 20 38:4, 22 39:4, 9 40:3, 8, 15, 20 41:6, 19, 25 42:4, 17, 24 44:2, 12, 18 45:14 46:5, 12, 22 47:1, 11, 16, 22 scroll 36:21 46:16 seal 52:1 second 12:19 15:9 33:15 47:3 Section 37:8 39:23 45:5 46:19 see 6:7, 10, 12, 19 10:25 11:19 14:21 15:2, 4, 13, 20, 22 23:9 25:3, 21 26:21 28:20 29:10 31:10, 20, 21 32:8 33:24 34:4, 24 35:13, 14, 15 37:7, 9, 11, 12, 15 39:6, 23 40:1, 5, 9, 13, 16 45:8 46:19,
--	--	---	--

23 47:2, 5, 9, 12, 17 49:6 seeing 7:3 seen 6:23 7:6, 10, 11 segment 16:16, 18 17:21 19:7, 15 20:5 24:5 select 6:15 sending 32:1 50:11 sense 16:23 sent 13:23 15:11 sentence 11:14, 19 14:19, 23, 24 15:9, 13 September 1:1, 13, 20 2:1 3:1 4:1 5:1 6:1 7:1 8:1 9:1 10:1 11:1 12:1 13:1 14:1 15:1 16:1 17:1 18:1 19:1 20:1 21:1 22:1 23:1 24:1 25:1 26:1 27:1 28:1 29:1 30:1 31:1 32:1 33:1 34:1 35:1 36:1 37:1 38:1 39:1 40:1 41:1 42:1 43:1 44:1 45:1 46:1 47:1 48:1 49:1 50:1 51:1 52:1, 2 sequence 13:10, 12, 14, 16, 23 14:2 15:12 16:14 17:18 18:22, 23 20:3	21:5, 9, 10, 11, 14, 17, 18, 20 22:8 23:8, 25 24:8, 9, 14, 25 25:25 34:24 37:18 38:2 40:11 41:3 45:7, 8, 11, 12 47:20 sequences 35:2 41:4 47:20 series 5:21 22:10 Shapiro 2:9 3:5 4:15 6:16 7:1, 7, 16, 23 8:2, 11 9:3, 12 10:13 11:6, 24 12:3 13:1, 8, 21 14:4, 15, 22 15:15 16:7 17:3, 9, 14 18:3, 24 19:6, 20 20:11 21:15 22:3, 11, 17 23:4, 15 24:15 25:17 27:3, 11, 19 28:16 29:17 30:20 31:15 32:18 34:11, 16 35:3, 8, 13, 16 36:7, 11, 16 37:2, 6, 13, 19 38:3, 15 39:3, 8 40:2, 7, 14, 19 41:5, 18, 24 42:3, 16, 23 43:2, 7, 11, 19 44:11, 17 45:13, 23 46:11, 21, 25 47:10, 15, 21	48:1, 6, 15, 18 49:15, 23 50:7, 11 Sheet 3:8 short 18:12 20:20 28:24 30:13 43:12 45:7 48:12 Shorthand 1:22 51:4 signal 26:5 Signature 3:9 significant 28:2, 3 Signing 51:21, 22, 23 similar 30:23 simplest 26:7 single 18:1 21:6, 13 Singular 3:23 33:17 sitting 24:20 six 31:20, 22 33:7 skill 8:9, 15, 18, 25 9:5, 6, 10, 15, 17, 21, 24 10:10, 14, 18 11:5 13:15, 24 14:10 17:16, 17 18:8 21:21 23:21 24:4, 12, 24 25:24 27:8 31:12, 17 34:9, 14, 19, 20 skilled 9:1, 5, 7, 10 10:11, 15 skills 10:22, 24 slightly 26:4	slow 43:9 somewhat 44:25 sophisticated 10:21 11:2 sorry 17:1 32:10 special 17:5 19:21 specific 30:25 31:10 specifically 17:25 19:18 23:5 33:11 specification 12:15 13:4, 9 23:23 24:3 specifications 12:8 specifics 45:15 spectrum 12:12 square 26:9 27:5, 6 49:6, 9 Srikant 4:17 stable 33:16 stamped 32:10, 11 standalone 18:21 Standard 36:15, 20, 24 39:12 standardization 41:16 standards 23:18 33:24 34:10, 15 starting 4:12 47:14 State 1:22 4:11 8:24 9:17 11:14 14:12, 19 15:17 16:15, 17 17:21 19:13
--	--	---	--

21:21 24:19 28:19 51:1, 5 stated 1:25 51:6 statement 11:22 STATES 1:1 8:12 25:8 45:7 Std 3:14, 15 stenography 4:8 stereotype 1:23 stream 18:1, 5 Street 2:4 strike 17:23 21:6, 24 studied 37:23, 24 study 14:17 42:7, 8 sub 26:20 subcarrier 27:24 subsection 39:23 40:5 substance 20:23 49:25 substitute 8:16 10:19 sufficient 21:14 22:2 suggesting 15:23 suggestion 19:10, 12, 14 Suite 2:4 supervision 51:11 Supplement 3:15 support 11:22 supports 7:14, 22 25:23 sure 15:22 36:13, 23 39:5, 6 40:21 47:13	surrounding 13:3 SVD 32:7, 16, 22, 24 33:18, 21 switch 26:14 sworn 1:19 4:20 51:8 symbol 12:11 15:12 21:6, 13, 16, 17, 19 22:19 25:16 symbols 11:16, 17 17:13 21:9, 21, 25 22:10, 14, 16 23:2, 3 24:10 25:10, 11, 15, 21, 22 26:2, 3 47:9 Sync 3:18 42:21 45:6 47:19 synchronization 13:25 system 27:23 systems 33:17 systolic 33:2 < T > take 12:8, 15, 19 20:12 43:3, 5, 8, 10 48:7 50:12 taken 1:19, 23 20:20 28:24 42:12 43:12 48:12 51:16 talking 37:2, 4 task 38:6 42:2, 9 tasks 13:25 technique 26:7, 8, 10, 12	techniques 25:12, 14 26:1, 5, 13 Telephone 2:5, 11 tell 43:9 ten 43:4 ten-minute 20:16 term 21:11, 19 23:17 25:25 31:20 terms 23:24 24:14 testified 4:20 testify 51:9 testimony 5:1 20:23 41:6 44:3 45:14 46:5, 12, 22 47:1, 11, 23 51:12 Texas 1:23 2:5 4:6 51:1, 5 TGn 3:15 42:21 47:19 thank 16:9 43:11 49:15 Thanks 43:11 thing 5:9 think 5:2 6:18 7:9 9:14, 16, 23 11:7 12:8 13:22 14:9, 16 15:25 16:3, 8, 13 17:4 18:4, 11, 15, 25 19:14, 16, 22, 23 21:19 22:6, 12, 25 24:1 25:25 26:5, 13 27:4,	12, 20 28:10 29:20 37:24 38:7 39:13, 17 42:1 45:1 47:3 48:3 third 12:19 thought 24:8 three 28:8 time 8:18 9:19 12:9, 15 16:6, 10, 12 22:1 35:24 36:20 37:23 38:23 39:12 40:23 42:7 44:6, 21 46:7, 16 48:11 49:16 today 4:16 48:4 TODOR 1:1, 12, 17 2:1 3:1, 3 4:1, 19 5:1 6:1 7:1 8:1 9:1 10:1 11:1 12:1 13:1 14:1 15:1 16:1 17:1 18:1 19:1 20:1 21:1 22:1 23:1 24:1 25:1 26:1 27:1 28:1 29:1 30:1 31:1 32:1 33:1 34:1 35:1 36:1 37:1 38:1 39:1 40:1 41:1 42:1 43:1 44:1 45:1 46:1 47:1 48:1 49:1 50:1 51:1 52:1 TRADEMARK 1:1 training 11:16 17:13 21:6, 9,
--	--	---	--

13, 16, 17, 19, 21, 25 22:9, 14, 16 23:2, 3 24:10 25:10, 11, 15, 16, 21, 22 26:2, 3 35:1 40:11 41:3 45:8, 11 47:9, 20 transcript 50:8, 10 transcription 51:11 transformer 30:7 transmission 11:16 13:24 14:12, 20 15:1, 4, 17 16:2, 17, 18, 19, 20, 24 17:21, 25 18:2, 7, 9, 12, 17, 21 19:3, 5, 8, 15, 19 20:2, 4, 9 22:15 24:5 transmissions 18:16 transmit 21:23 22:5, 6 transmits 22:14 transmitted 22:10 transmitter 29:9, 13 30:10, 16 39:16 transmitting 13:13 21:25 22:1, 19 30:1 TRIAL 1:1 true 51:7, 12 truth 51:9 try 8:16 48:25	trying 9:13 23:22 turn 6:1 15:6 25:5 39:20 45:2 Turning 8:6 21:1, 2 29:1 two 21:9, 21, 23, 25 22:1, 5, 9, 16 23:1 24:10 25:20 27:23, 24, 25 29:2, 4, 7, 15, 20 30:4, 5, 9, 15 32:10 33:22 40:10 41:3 49:6 TX 52:5 type 16:11 < U > U.S 3:21, 22 unambiguous 16:4 understand 5:13 9:13 16:8 23:22 24:2, 4 27:9 understanding 23:23 25:24 31:3 understood 9:19, 24 10:3, 4 17:17 18:9 21:20 24:25 27:13 undertake 30:24 unit 49:7 unitary 29:9, 14 30:2, 10, 17 UNITED 1:1 unmarked 5:10	uploaded 5:19 35:6 36:3 38:10 43:14 uploading 45:18 USA 1:3 use 10:18, 21 < V > vague 42:19 43:1 44:24 validity 30:22 31:4 Value 3:23 33:17 vector 33:17 Vice 2:3 view 23:22 vote 41:22 44:15, 19, 22 voted 44:21, 25 votes 42:12 44:24 voting 41:21 44:20 vs 1:5 < W > waived 51:22 want 5:20, 22 26:17 43:5 50:9 waste 35:24 38:22 44:6 46:6 way 10:2 28:20 48:23 Wayne 4:9 well 5:20 8:12, 13 9:13 13:9 14:16 18:4 19:21 21:16 22:22 26:4 27:21 29:2	38:5 39:10 43:2 49:1 Wells 38:7 39:13, 18 40:24 41:9, 12 46:14 48:1 We're 20:21 28:25 48:10, 13 we've 20:11 Wilmington 2:10 window 5:5, 11 Wireless 3:15 11:16 13:11, 13 29:8, 12, 25 30:6, 9, 16 withdraw 27:14 witness 1:18 3:2, 9 4:9 20:16 43:7 48:5, 8 49:24 50:7 51:13 words 40:9, 16 47:2 working 42:11 writing 51:11 written 17:15 wrong 15:3 WWiSE 3:15 42:14 44:15 45:10, 15 < X > XX 51:21 < Y > Yang 3:24 32:1, 4, 6, 25 33:14, 15, 21 Yeah 32:13
---	---	--	---

50:11 years 44:13 yield 49:6, 9 < Z > ZACHARY 2:3 zero 26:7 zoom 5:4			
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