

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

DISH NETWORK LLC,

Petitioner,

vs.

Case No. IPR2024-00393

ENTROPIC COMMUNICATIONS, LLC, US Patent No. 7,295,518

Patent Owner.

_____ /

VIDEO-RECORDED DEPOSITION OF TIM A. WILLIAMS, PH.D.

Remote Zoom Proceeding

Danville, California

Wednesday, February 26, 2025

REPORTED BY:

LESLIE ROCKWOOD ROSAS, RPR, CSR 3462

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ENTROPIC EXHIBIT 2009

DISH v. Entropic

IPR2024-00393

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

DISH NETWORK LLC,

Petitioner,

vs.

Case No. IPR2024-00373

ENTROPIC COMMUNICATIONS, LLC, US Patent No. 7,594,249

Patent Owner.

_____ /

Video-recorded deposition of TIM A. WILLIAMS,
PH.D., taken on behalf of Patent Owner, Remote Zoom
Proceeding from Danville, California, beginning at 9:03
a.m. Pacific Standard Time and ending at 10:47 a.m.
Pacific Standard Time, on Wednesday, February 26, 2025,
before Leslie Rockwood Rosas, RPR, CSR No. 3462.

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I N D E X

WEDNESDAY, FEBRUARY 26, 2025

WITNESS

EXAMINATION

TIM A. WILLIAMS, PH.D.

BY MR. HALVERSON

8

QUESTIONS WITNESS INSTRUCTED NOT TO ANSWER:

(NONE)

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DEPOSITION EXHIBITS

TIM A. WILLIAMS, PH.D.

NUMBER	DESCRIPTION	IDENTIFIED
Exhibit 1036	Second Declaration of Tim A. Williams	7

PREVIOUSLY MARKED EXHIBITS REFERENCED:

EXHIBIT NUMBER	PAGE
Exhibit 1001	17
Exhibit 1013	38

1 Danville, California; Wednesday, February 26, 2025

2 9:03 A.M.

3
4 PROCEEDINGS

5 TIM A. WILLIAMS, PH.D.,

6 called as a witness, having been duly sworn,
7 was examined and testified as follows:

8
9 (Exhibit 1036, Second Declaration of Tim A.
10 Williams, marked for identification
11 electronically by counsel.)

12 THE REPORTER: Good Morning. This is Leslie
13 Rosas, RPR, CSR 3462.

14 Good morning, Dr. Williams. Would you raise
15 your right hand?

16 Thank you, sir.

17 You do solemnly state and affirm that you will
18 tell the truth, the whole truth and nothing but the
19 truth?

20 THE WITNESS: I do.

21 THE REPORTER: Thank you, sir.

22 You may proceed, Counsel. Please introduce
23 yourselves.

24 MR. HALVERSON: Erik Halverson from K&L Gates on
25 behalf of Patent Owner Entropic, and with me today is

1 Jared Lund, also from K&L Gates.

2 MR. AMER: Alyaman Amer from Fish & Richardson.
3 I'm joined today by Mike Ballanco, also from Fish &
4 Richardson, on behalf of Petitioner Dish Networks LLC.

5 THE REPORTER: Thank you.

6 You may proceed, Counsel.

7

8 EXAMINATION

9 BY MR. HALVERSON:

10 Q. Dr. Williams, welcome back. How are you this
11 morning?

12 A. I'm fine.

13 Q. Since we spoke last you've prepared and
14 submitted a second declaration to this proceeding; is
15 that right?

16 A. I have.

17 Q. And if I use the term "'518 patent," you'll
18 understand which patent we're talking about?

19 A. I will.

20 Q. So same rules as last time, but brief recap. If
21 there's a question pending and you need a break, I ask
22 that you answer that question before we go on break; is
23 that fair?

24 A. Yes.

25 Q. If you don't understand a question or are

1 looking for additional clarity, by all means please ask.
2 If you answer the question, the record will reflect an
3 answer to that question, even if there is some
4 uncertainty in your mind; is that fair?

5 A. Yes.

6 Q. And because we're on Zoom this time around, it's
7 particularly important that we do our best not to talk
8 over each other. I will try my hardest to wait for you
9 to finish answering my questions, if you can try your
10 hardest to wait for me to finish asking my questions
11 before you try to answer them; is that fair?

12 A. Yes.

13 Q. And last but not least, for the court reporter's
14 benefit, spoken word answers are far easier to take down
15 than nods or "uh-huhs" or "huh-uhs," so if you could
16 please do your best to respond with at least words in
17 your answers; is that fair?

18 A. Yes.

19 Q. Do you have your second declaration,
20 Exhibit 1036, available to you?

21 A. I do.

22 Q. And if at any point in time you need additional
23 information or documents, please ask. I will assume that
24 you are not looking at other documents that have not been
25 introduced into the proceeding yet or that we have not

1 talked about yet unless you let me know; is that fair?

2 A. Yes, it is.

3 Q. And do you have access to all of the exhibits in
4 this proceeding on your machine there?

5 A. I do.

6 Q. Do you have open any email or chat software
7 right now?

8 A. I can close it.

9 Q. That would be great if you don't mind.

10 A. No problem.

11 It's closed.

12 Q. And in the exhibits that you have access to
13 right now, are they annotated copies or are they clean
14 copies?

15 A. They are clean copies.

16 Q. Wonderful.

17 And do you have any notes or other documents
18 available to you beyond the exhibits in this proceeding
19 right now?

20 A. No.

21 Q. Wonderful.

22 In 1036, is that your signature on the first
23 page?

24 A. It is.

25 Q. At the very top of this paragraph -- or of this

1 page, you introduce a concept about your analysis
2 continuing. What do you mean by that?

3 Do you see that?

4 A. This reflected my opinion -- this document
5 reflected my opinion as of January 31st, 2025. Other
6 information might come to light subsequently, and I may
7 modify my opinion or extend my opinion.

8 Q. Has any information come to light between
9 January 31st, 2025, and today, February 26th, 2025, that
10 impacts, alters or changes the opinions that you have in
11 Exhibit 1036?

12 A. Not that I can recall.

13 Q. Are there any changes you would like to make
14 having reviewed your declaration?

15 A. Not at this time.

16 Q. All right. Are you familiar with the concept of
17 splitters? I think we talked about them at your last
18 deposition.

19 A. I am.

20 Q. Are you familiar with coax splitters?

21 A. I'm familiar with splitters that interface with
22 coax cabling.

23 Q. Are you familiar with inter- -- splitters that
24 interface with DSL lines?

25 A. I'm familiar with splitters that interface with

1 twisted pair cable over which DSL service may be
2 provided.

3 Q. Have you ever heard of a splitter referred to as
4 a DSL splitter?

5 A. No.

6 Q. How about a POTS splitter, P-O-T-S?

7 A. Yes.

8 Q. What is a DSL signal -- what is the mechanism
9 over which a DSL signal -- sorry. Poorly worded
10 question.

11 What is the medium over which a DSL signal
12 enters a user's home?

13 A. I don't understand the question.

14 Q. What do people use DSL for?

15 A. I don't understand the question.

16 Q. Have you ever used DSL?

17 A. I've used Digital Subscriber Loop services, yes.
18 I -- okay.

19 Q. And for what?

20 A. What are the services used for?

21 Q. Yes. What did you use Digital Subscriber Loop
22 services for?

23 MR. AMER: Objection. Scope.

24 THE WITNESS: Access to voice and data services
25 provided by a service provider.

1 Q. BY MR. HALVERSON: Who was the service provider
2 that you used?

3 MR. AMER: Objection. Scope.

4 THE WITNESS: I don't recall.

5 I should --

6 Q. BY MR. HALVERSON: So you --

7 A. I should also note that I've designed DSL
8 chipsets, so I'm both --

9 Q. Oh, I'm sorry.

10 A. I'm both a user and a designer of Digital
11 Subscriber Loop services -- or Digital Subscriber Loop
12 hardware.

13 Q. And so that Digital Subscriber Loop provides
14 voice services and data services to a customer; is that
15 right?

16 A. Yes.

17 Q. And are those two signals provided using
18 overlapping carrier frequencies?

19 MR. AMER: Objection. Vague.

20 THE WITNESS: I don't understand the question.
21 There are more than two signals, and I don't understand
22 "overlapping."

23 Q. BY MR. HALVERSON: I thought I said services.
24 Excuse me.

25 So are the data services and voice services

1 provided using frequencies that are the same or are they
2 on different carrier frequencies?

3 A. Those services are typically provided using
4 different frequency.

5 Q. Why?

6 MR. AMER: Objection. Vague.

7 THE WITNESS: Why are they provided using
8 different frequencies?

9 Q. BY MR. HALVERSON: Correct.

10 A. Well, I suppose they could be provided using the
11 same frequency -- voice and data could be provided using
12 the same frequency as if you were using digital voice
13 delivery. But analog POTS service -- analog POTS service
14 occupies a particular frequency band and DSL was designed
15 to reside frequency-wise above that POTS service
16 frequency allocation.

17 Q. Do you know what frequency band was allocated to
18 POTS services?

19 A. From 300 hertz to 3,000 hertz.

20 Q. You said that the data services were allocated a
21 frequency band above that; is that right?

22 A. Yes. There's also video services that were
23 provided later -- later in the development.

24 Q. When you say "later," what timeframe are you
25 referring to?

1 A. Late '90s.

2 Q. Were those provided over the data frequency
3 bands, or were they provided over additional frequency
4 bands?

5 A. Well, it's all data, so I don't understand your
6 question.

7 Q. When you say "it's all data," what are you
8 referring to?

9 A. The video delivery was a digital data delivery
10 service.

11 Q. Okay. What frequency bands were allocated to
12 data services?

13 A. Depends on which version of the standards we're
14 talking about.

15 Q. How about in 2001?

16 A. Depends on what type of service we're talking
17 about.

18 Q. At any point in time were there data services
19 allocated to frequency bands between 300 hertz and 3,000
20 hertz?

21 A. I think you need to narrow your question. In
22 DSL services, is that your question? Because --

23 Q. Yes.

24 A. -- the answer would be yes if we go outside of
25 DSL services.

1 Q. Just for DSL right now.

2 A. ISDN services, the answer would be yes.

3 Q. And for DSL?

4 A. Not that I recall. Well, data -- data over
5 modem would have been provided over the analog POTS
6 frequency band, so traditional dial-up modems would
7 deliver data over that frequency band, so it's somewhat
8 of a complicated answer to your question.

9 Q. And do you understand traditional dial-up modems
10 to provide data as a form of DSL services?

11 A. No. But your question was about data. Delivery
12 of data over that analog POTS frequency spectrum, so it
13 was delivered -- data could be delivered over those
14 frequency bands by the use of ISDN or the use of in-band
15 dial-up modems.

16 Q. Got it.

17 And then I had limited my question to DSL, and
18 then you went off on ISDN. So let's ask again for
19 clarity.

20 At any point in time were data services in DSL
21 allocated to frequency bands between 300 hertz and 3,000
22 hertz?

23 A. Yes.

24 Q. When?

25 A. When used in band modem.

1 Q. When a user subscribes to DSL services that has
2 internet access and phone services over their DSL line,
3 which signals reach their telephone landline?

4 MR. AMER: Objection. Vague. Objection.
5 Scope.

6 THE WITNESS: If they're using -- if they're
7 using a POTS service exclusively, it would be the POTS
8 frequency allocation. If they're using digital data
9 delivery through the digital portion of DSL services, it
10 would be the digital portion.

11 Q. BY MR. HALVERSON: When you say "if they're
12 using digital data delivery through the digital portion
13 of DSL services," you're referring to phone signals --
14 digital phone signals?

15 A. I am.

16 Q. Do you have the '518 patent in front of you? It
17 should have been previously marked in this proceeding --

18 A. Not in front of me, but I can find it.

19 Q. -- as Exhibit 1001.

20 I'm happy to add it to Exhibit Share, but if you
21 have a local copy and you prefer to use that, I don't
22 have to.

23 A. I have a clean copy.

24 THE REPORTER: Counsel, could you introduce it
25 just for me, please?

1 MR. HALVERSON: Sure can. Give me a second.

2 THE REPORTER: Thank you so much, Counsel.

3 MR. HALVERSON: Sure.

4 Q. Dr. Williams, does the '518 patent look familiar
5 to you?

6 A. It does.

7 Q. Have you reviewed it?

8 A. I have.

9 Q. Are you familiar with the claims?

10 A. I am.

11 Q. Specification?

12 A. I am.

13 Q. Figures?

14 A. Yes.

15 Q. Perfect.

16 So Claim 1 -- Claim 1 requires a splitter; is
17 that correct?

18 A. Yes.

19 Q. And out of that splitter there are a plurality
20 the tap ports; is that right?

21 A. Yes.

22 Q. What's a tap port?

23 A. It's a port that presents to anything connected
24 to it a portion of the spectrum presented to the common
25 port.

1 Q. So is it your understanding that the splitter
2 that is claimed in the '518 patent presents a portion of
3 the incoming signal to a given tap port?

4 A. A portion of the spectrum of the incoming
5 signal, yes.

6 Q. I'm going to go back to the declaration. You
7 offered some opinions in 1036 regarding an HFC, hybrid
8 fiber coaxial network. Do you recall that?

9 A. Yes.

10 Q. When did you first become exposed to a hybrid
11 fiber coaxial network?

12 A. Probably in the 2000s.

13 Q. Is that fiber optical fiber?

14 A. Yes.

15 Q. Are you familiar with any other kind of fiber
16 that it could be?

17 A. No.

18 Q. When you first became exposed to optical fiber
19 in an HFC network, was it providing analog communication
20 waves?

21 A. I don't understand your question.

22 Q. Are you familiar with what analog communications
23 are?

24 A. Of course.

25 Q. Are you familiar with what digital

1 communications are?

2 A. Yes.

3 Q. Can somebody send a digital signal over a fiber
4 optic line?

5 A. By using an analog signal.

6 Q. Is it your opinion that the only way to
7 communicate a digital signal over a fiber optic line is
8 with an analog wave signal?

9 A. Yes. The optics are continuous in nature and
10 not discrete.

11 Q. You've never seen an optical line provide
12 digital pulses?

13 A. The digital pulses traverse the optical cable as
14 analog signals. They have discrete levels, but they
15 propagate as analog signals.

16 Q. And I guess a better question -- forgive me.
17 That was not a very well-worded one -- is: Have you ever
18 seen binary data transmitted over an optical line?

19 A. Yes.

20 Q. And it's your opinion that that is an analog
21 signal because there is an optical pulse of light; is
22 that right?

23 A. On the physical media, the wave travels as an
24 analog wave, not a discrete wave.

25 Q. And so is there always data modulated onto that

1 wave?

2 A. You know, in sonic or optical networks there is
3 a -- there is a carrier, and onto that carrier are
4 modulated information to be conveyed from transmitter to
5 the receiver. That information may be digital in nature,
6 but the transport of that information through the media
7 is via an analog wave, so that analog wave is subject to
8 the types of impairments that we're talking about in this
9 case, reflections, loss, additional noise coming into
10 the -- to the cable.

11 Just like we talked about before, all types of
12 transmission waves experience the same types of
13 impairments regardless of the media.

14 Q. Does a ham radio signal interfere with the
15 optical carrier in an HFC network?

16 A. Sometimes, yes.

17 Q. How?

18 A. It can inject noise, what is seen on the optical
19 network as noise, into the optical network.

20 Q. Even though the wavelength of those two signals
21 are significantly different, there is still an impact in
22 the sense of noise?

23 MR. AMER: Objection. Vague.

24 THE WITNESS: Yes, there is. However, the
25 frequencies -- in the first order -- in the zeroth order

1 the frequencies are different. However, nonlinearities
2 in some physical aspects of the cable will introduce
3 harmonic distortion of the ham wave, which will produce
4 the 5th, 7th, 10th, 11th harmonic of the original signal,
5 for example, which brings it into the optical wave band.

6 Q. BY MR. HALVERSON: Can you go to page -- we're
7 going to use the bottom page numbers of your
8 declaration -- page 9 of your declaration for me?

9 A. All right.

10 Q. It's going to be the middle of paragraph 12.

11 A. Yes.

12 Q. And I will do my best to make sure that I also
13 am referencing paragraphs in my questions, because your
14 declaration has two sets of page numbers on it, but if at
15 any point in time you are not sure, please clarify with
16 me.

17 There's a figure here that depicts a, quote,
18 "Typical HFC network architecture for a large
19 metropolitan area."

20 Do you see that?

21 A. I do.

22 Q. What portions of that network are coaxial?

23 A. Actually, the paragraph says, "The figure below
24 illustrates the convergence of different types of wired
25 networks, including coaxial networks (HFC cable) and

1 twisted pair networks (telephone and computer) into
2 converging broadband networks."

3 Can I have the question again, please?

4 Q. And what you just read was your characterization
5 of the picture; right? It was from your declaration?

6 A. I did.

7 Q. And the label on the picture where it says --
8 Figure 1.2 says, "Typical HFC network architecture for a
9 large metropolitan area"; right?

10 A. All right. We're on page 9 -- native page 9 of
11 my report; right? Paragraph 17?

12 Q. We've already bumped into it. No. So sorry.
13 Can you go to paragraph 12 for me?

14 A. Oh, I see. Okay.

15 Q. The version that I have has two sets of page
16 numbers on it. I suspect it was stamped when it was
17 provided in the IPR. I assume that yours only has a --
18 the word page number on the bottom; is that right?

19 A. Yeah. I have -- well, I have the PDF page
20 number, and I have the -- what I call the native page
21 number, which is the page number at the bottom.

22 So you're on page 7 of the native page number,
23 which is paragraph 12? Or you're on page 6?

24 Q. I was on page 6, yeah.

25 A. All right.

1 Q. Yeah. Let me start over.

2 So on page 6 you see a picture with a satellite
3 dish at the top of it, top left?

4 A. I do, yes.

5 Q. There's a couple houses at the bottom right?

6 A. I do.

7 Q. And the legend on the figure, Figure 1.2, says,
8 "Typical HFC network architecture for a large
9 metropolitan area"; right?

10 A. Yes.

11 Q. And so in that image, that figure, which
12 portions of the network are coaxial cables?

13 A. From the -- entering the homes on the -- on the
14 bottom where it says, "RF Amplifiers," everything else
15 is -- everything else is fiber.

16 Q. And so the lines into the homes have a series of
17 RF amplifiers on them and those lines originate at
18 something the figure calls a fiber node; is that right?

19 A. Yes.

20 Q. And so everything upstream from the fiber node
21 is optical fiber; right?

22 A. Yes, that's my understanding.

23 Q. And downstream is coaxial; right?

24 A. Yes.

25 Q. Will you go to the next page for me, still in

1 paragraph 12, the second figure in paragraph 12?

2 A. Yes.

3 Q. This is showing a block diagram of the modem;
4 right?

5 A. Yes, simplified block diagram.

6 Q. Where does that appear in the picture Figure 1.2
7 that we were just looking at? Where is that modem?

8 A. It appears at the fiber node, and it appears at
9 the home.

10 Q. So there is one modem -- excuse me. There is
11 one modem at the interface between the optical and the
12 coax, and there is another modem on the entry point into
13 the home, also on the coax?

14 A. That's fair. It doesn't necessarily have to be
15 at the entry point to the home, but that's -- that's one
16 particular architecture.

17 Q. QAM modulation is a modulation technique that
18 can be used on signals sent down a coaxial cable; right?

19 A. Yes.

20 Q. QAM modulation can be used as a modulation
21 technique for signals sent over a twisted pair cable;
22 right?

23 A. Yes.

24 Q. QAM modulation can be used as a modulation
25 technique for signals sent wirelessly; right?

1 A. Yes.

2 Q. Does 802.11 allow for QAM modulation, do you
3 know?

4 A. It does.

5 Q. Does 3G cellular?

6 A. It does.

7 Q. Does 2G cellular?

8 A. It does.

9 Q. Does 4G cellular?

10 A. It does.

11 Q. Will you go to paragraph 14 for me?

12 A. Yes.

13 Q. Here you refer to Mr. Garrett's discussion of
14 new evidence.

15 Do you see that?

16 A. I do.

17 Q. What do you mean "new evidence"?

18 A. His two points, (a) and (b) there I list, I
19 consider to be new evidence.

20 Q. Why is it new evidence?

21 A. Because he's expressing these opinions for the
22 first time.

23 Q. And that's what I'm trying to figure out is:
24 Have you seen other opinions from him?

25 A. Yes.

1 Q. When?

2 A. Don't recall.

3 Q. So you're not sure what the old evidence or
4 first set of opinions are, but you know that the
5 declaration that you reviewed is his new evidence or
6 supplemental evidence?

7 A. This is evidence that I did not consider in my
8 first report.

9 Q. Do you know why?

10 A. No.

11 MR. AMER: Objection. Vague.

12 Q. BY MR. HALVERSON: Go back to paragraph 2 for
13 me.

14 A. Yes.

15 Q. You've got some bullet points here that are
16 listing some references that you've analyzed.

17 Do you see that?

18 A. Yes.

19 Q. Were you familiar with these references when you
20 put in your first declaration?

21 A. Not the decision granting institution. Not --

22 Q. Okay.

23 A. Not the patent owner's response.

24 Q. Okay. How about the rest of them?

25 A. Chen I think I've seen before in other cases.

1 '349, don't recall.

2 '905, don't recall.

3 Broadband cable TV network access, I've probably
4 seen that before. I don't explicitly recall.

5 "New Technologies Take the Network Home," no.

6 "Voice & Data Handbook," yes.

7 And Deposition of Mr. Garrett, no.

8 Q. When had you seen the Voice & Data
9 Communications Handbook before?

10 A. Other cases.

11 Q. Have you relied on it in prior cases?

12 A. Don't recall.

13 Q. Do you find it to be an accurate textbook?

14 A. I found no errors in it.

15 Q. These exhibits, notwithstanding the first two
16 which are papers in the proceeding, but the references
17 1031, 1032, 1033, 1034, 1037, 38 and 39, did you bring
18 any of those to the attention of counsel, or did counsel
19 provide you with copies of those in the first instance?

20 MR. AMER: Objection. Vague.

21 THE WITNESS: I don't recall.

22 Q. BY MR. HALVERSON: Go to paragraph 6 for me.

23 A. Yeah.

24 Q. The second sentence is talking about weighing
25 benefits lost and gained against each other.

1 Do you see that?

2 A. I do.

3 Q. How did you decide how to weigh benefits lost
4 and gained?

5 I guess let me -- let me ask a -- a precursor
6 question to that.

7 Did you do any weighing of benefits in this
8 case?

9 A. Well, the desire -- the solution to the problem
10 presented by the '518, that has benefits to -- the
11 solution provider is the end goal. So weighing the --
12 the benefits and costs of providing that solution is the
13 tradeoff I'm discussing here.

14 Q. So figuring out the costs and benefits of
15 reaching that end goal is the analysis that you're
16 talking about here?

17 A. It is.

18 Q. When you say "weighed against one another," did
19 you give them equal weight?

20 A. We're speaking in the abstract, so I don't
21 understand the question.

22 Q. Well, it's your opinion. I'm not sure that it's
23 abstract.

24 When you did this weighing that you refer to in
25 paragraph 6, did you give them equal weight?

1 A. What is "them"?

2 Q. Any benefits that you weighed.

3 A. I don't recall.

4 Q. Do you recall performing that exercise?

5 A. Yes.

6 Q. Do you recall what the outcome of that exercise
7 was?

8 A. It's expressed in my opinion.

9 Q. What is the outcome of that exercise?

10 A. The opinions expressed in my report.

11 Q. You don't have any -- any additional opinions
12 about -- or additional context about the weighing of
13 benefits that you performed beyond what is expressly
14 stated in your report; is that right?

15 A. That's correct.

16 Q. So if there's no articulation in your report
17 about the weight that was afforded to a benefit that was
18 either lost or gained, how would I understand what weight
19 you ascribed as you did that exercise?

20 A. You would understand the desirability of
21 achieving the problem presented by the '518 and the
22 potential solutions provided by the art and how a POSITA
23 would weigh the costs and benefits of those solutions in
24 terms of solving the problem of the '518.

25 Q. You would agree that there are some benefits

1 that are gained by the combination that you propose in
2 your declaration; right?

3 A. Yes.

4 Q. And you would also agree that there are some
5 benefits that are lost by the combinations proposed in
6 your two declarations?

7 A. Not that I've expressed.

8 Q. So in -- it's your opinion that the combinations
9 that you've proposed only provide benefits, no
10 downsizing?

11 A. I have not expressed that opinion.

12 Q. When you say you have not expressed that
13 opinion, are you disagreeing with the conclusion, or are
14 you saying that you have not been asked to and have not
15 provided an opinion on that question?

16 MR. AMER: Objection. Vague.

17 THE WITNESS: I don't understand the question.

18 Q. BY MR. HALVERSON: Well, I said it's your
19 opinion that the combinations that you've proposed only
20 provide benefits, no downsides, and you said, "I have not
21 expressed that opinion"; right?

22 A. I believe so, yes.

23 Q. And so when you said you have not expressed that
24 opinion, are you disagreeing with what I said, or are you
25 saying that your report simply doesn't have that opinion

1 in it?

2 A. I'm saying that I have not expressed the opinion
3 that there are downsides, and I've not enumerated those
4 downsides in my report.

5 Q. Do you have an opinion about whether or not
6 there are downsides to the combinations that you
7 proposed?

8 A. Not that I've expressed.

9 Q. I understand.

10 But do you have one?

11 A. Not at this time.

12 Q. Can you go to paragraph 9 for me?

13 A. Yes.

14 Q. About halfway through that paragraph there's a
15 sentence that begins, "By the alleged priority date."

16 Do you see that?

17 A. Yes.

18 Q. You say, "These concepts."

19 What concepts are you referring to?

20 A. If you look at the second sentence in that
21 paragraph, the concepts described in the '518 patent,
22 "Like channel characterization using known sequences,
23 multi-carrier modulation and bit loading." Those are the
24 concepts.

25 Q. So what you're saying here is channel

1 characterization using known sequences, multi-carrier
2 modulation and bit loading were concepts that were
3 commonly used in wired and wireless networks by the
4 priority date of the '518 patent; right?

5 A. That's correct.

6 Q. What's your evidence for that? There's no
7 citation there.

8 A. Personal experience.

9 Q. The last sentence of that paragraph says that,
10 "The '518 patent cites to and incorporates by reference
11 noncoaxial references that use these concepts."

12 Do you see that?

13 A. Yes.

14 Q. Why does that matter?

15 MR. AMER: Objection. Vague.

16 THE WITNESS: Because I -- it's my opinion that
17 the concepts of the '518 patent are independent of the
18 medium by which the waves propagate from source to
19 destination. So cable medium, twisted pair medium are
20 irrelevant with regards to the core concepts of the
21 '518 patent.

22 Q. BY MR. HALVERSON: But what does the -- what
23 does that have to do with what is cited to and
24 incorporated by reference in the '518 patent?

25 A. In other words, the '518 is not -- patent is not

1 exclusively discussing coaxial medium.

2 Q. I see.

3 So you're using the fact that the patent refers
4 to other mediums to base your conclusion that the
5 '518 patent is independent of a given medium?

6 MR. AMER: Objection. Misstates testimony.

7 THE WITNESS: That plus my POSITA understanding
8 of what's disclosed in the '518.

9 Q. BY MR. HALVERSON: And so did the fact that the
10 '518 patent cites to these references inform your
11 analysis that you did in your declarations?

12 A. I considered all evidence.

13 Q. Including the fact that the '518 patent cites to
14 and incorporates by reference noncoaxial references?

15 A. Yes.

16 Q. Go to paragraph 18 for me.

17 A. Yes.

18 Q. Why was twisted pair used solely for telephone
19 services traditionally?

20 A. Twisted pair started out in the early 1900s as
21 the -- as the local loop for providing telephone service.
22 So there was a huge instal base of twisted pair in the
23 country as of the -- the time of the '518 patent.

24 Q. So why was twisted pair used solely for
25 telephone services traditionally?

1 A. Because there was a huge install base.

2 Q. So the fact that there was already twisted pair
3 cabling installed in the homes was the reason why it was
4 used for telephone services? That's your opinion?

5 A. Not exactly. Twisted pair was -- was provided
6 for the local loop as well as internal to a residence
7 starting in -- around 1900. So over a hundred years of
8 twisted pair cable being put in the ground with bridge
9 taps and -- and other impairments added to the twisted
10 pair network.

11 So from -- for a hundred years, telephone
12 services were provided over twisted pair medium. And
13 when cable TV first started being deployed in the '80s --
14 late '70s, early '80s, coaxial cables were used for the
15 delivery of that television service.

16 Q. Why?

17 A. Because the cable provided a larger bandwidth
18 for conveyance of the broadcast television signals.

19 Q. Are you familiar with HomePNA?

20 A. Yes.

21 Q. I'm going to ask that again because the rough
22 looks very different.

23 What is your familiarity with HomePNA?

24 A. I know what it is. I've used it before. I've
25 seen devices.

1 Q. What is HomePNA?

2 A. It's a way to -- to send digital signals over
3 twisted pair home net- -- in-home twisted pair networks.

4 Q. Does HomePNA interact with DSL at all?

5 MR. AMER: Objection. Scope.

6 THE WITNESS: I don't understand the question.

7 Q. BY MR. HALVERSON: HomePNA you just said is a
8 way to send digital signals over twisted pair in an
9 in-home network; right?

10 A. Yes.

11 Q. Earlier when we were talking about DSL services
12 we were talking about how there are certain data services
13 that are sent over twisted pair networks, including
14 internet; right?

15 A. Basically, yes.

16 Q. So those are two separate -- I don't know
17 whether I would call them a protocol, but concepts that
18 both are sending -- that both are sending data over
19 twisted pair networks in a house; right?

20 A. They're two different standards. The
21 characteristics of the standards are different. The
22 characteristics of the protocols are different. The --

23 (Reporter clarification.)

24 THE WITNESS: Are different. Are different.

25 The -- the medium inside the house may be the

1 same. And DSL is also used for providing signals from a
2 central office to the point of presence on the house. So
3 DSL -- the DSL standard provides different capabilities
4 than the HomePNA.

5 Q. BY MR. HALVERSON: Do they interfere with each
6 other?

7 MR. AMER: Objection. Scope.

8 THE WITNESS: In what type of architecture?
9 We'd have to discuss the architecture.

10 Q. BY MR. HALVERSON: I'm not sure that I'm
11 tracking when you say "architecture" what kind of things
12 you're looking for as far as knowledge of the network.

13 Can you clarify a little bit for me, and I can
14 potentially ask a better question?

15 A. Yes. If I might, so if your question is: Can
16 both standards occupy the same medium simultaneously?

17 Q. Yeah.

18 A. I don't recall. I'd have to -- I'd have to
19 refresh my memory as to the frequency bands of the use.
20 But I think they may. I think they may.

21 MR. HALVERSON: We've been going about an hour.
22 Let's take a quick break.

23 THE WITNESS: Sure.

24 THE REPORTER: Off the record at 10:03.

25 (Recess.)

1 THE REPORTER: Back on the record at 10:13 a.m.

2 Q. BY MR. HALVERSON: Dr. Williams, do you have the
3 Isaksson reference, 1013, available to you?

4 A. I do.

5 Q. Can you open it up, and let me know when you've
6 got it?

7 A. I have it.

8 Q. It's a big PDF. But can you go to PDF page 5
9 for me? It's got a page number 3 up at the very top.

10 A. I'm there.

11 Q. First line should say, "NT Configurations";
12 right?

13 A. It does.

14 Q. The bottom of the first full paragraph has a
15 sentence referring to the DAVIC specification.

16 Do you see that?

17 A. Yes.

18 Q. Are you familiar with the DAVIC specification?

19 A. Vaguely.

20 Q. What is it?

21 A. It's a digital audio and voice specification
22 that was developed and was surpassed by other
23 technologies.

24 Q. The sentence says that the DAVIC spec reverses
25 this order to enable premises distribution of VDSL

1 signals over coax.

2 Do you see that?

3 A. I do.

4 Q. My understanding of what "this order" is is in
5 the prior sentence where it's referring to the downstream
6 channel carrier frequency location relative to the
7 upstream channel's carrier location -- carrier frequency
8 location.

9 That was an awful-worded sentence. I'm going to
10 try that one again. I'm sorry.

11 My understanding of what it means in that last
12 sentence of that paragraph where it says, "Reverses this
13 order," is in reference to the prior sentence with
14 regards to the relative location of the upstream and
15 downstream channels.

16 Is that what your read of this order is?

17 A. It is.

18 Q. Why does DAVIC have to do that?

19 MR. AMER: Objection. Scope.

20 THE WITNESS: Because DAVIC is reversing the
21 role of the traditional transmitter.

22 Q. BY MR. HALVERSON: When you say "reversing the
23 role of the traditional transmitter," what do you mean?

24 A. Normal practice would be to locate the
25 downstream channel above the upstream channel. That's

1 for VDSL delivered from the service provider.

2 But DAVIC is premise distribution. So DAVIC
3 reverses the role of the -- of the transmitter and
4 receiver in order to provide premise-based distribution.

5 Q. When you say "reverses the role of the
6 transmitter and the receiver," transmitter and the
7 receiver are two pieces of hardware; right?

8 A. Or one, yes. So normally you'd think of a VDSL
9 as being sort -- that -- where the -- they would be
10 sourced from the service provider and provided to the
11 equipment at the premises. But DAVIC reverses that role,
12 where the premises is the source of information and the
13 -- the synch of information is at the other side.

14 Q. So is DAVIC solely providing information from
15 the premise to a -- to the service provider?

16 A. No, not solely.

17 Q. So there are still bidirectional communications
18 happening in DAVIC; right?

19 A. Oh, sure. Uh-huh.

20 Q. And is DAVIC -- when this sentence refers to
21 premises distribution, does that spec refer to the way
22 that signals are distributed throughout the premises?

23 A. That's my understanding.

24 Q. So that's, for example, the upstream and
25 downstream from the modem to peripheral devices -- or end

1 devices, excuse me, on a home network or a building
2 network?

3 A. From the -- yes, from the -- from the DAVIC
4 interface.

5 Q. And so the upstream and downstream channels for
6 that portion --

7 A. Are flipped.

8 Q. -- are flipped from the upstream and downstream
9 channels of the outside of premise communications; right?

10 A. Yes.

11 Q. Why?

12 A. Well, one -- one reason is the self-interference
13 with signals. If you -- if you're going to move a set of
14 signals that are on this set of frequencies -- on the
15 upper set of frequencies to the lower set of frequencies,
16 you're isolating the effects of two systems that are
17 close to each other in terms of self-interference.

18 Q. And to do that movement of signal, you have to
19 take the signal off of whatever the carrier channel was
20 and put it onto the new carrier channel in a different
21 channel; right?

22 A. Not necessarily. Just mix it. You just mix it
23 to a different carrier.

24 Q. Does that cost power?

25 A. Sure.

1 Q. Does it cost time?

2 A. No.

3 Q. What would it cost?

4 A. Not --

5 Q. Sorry. Go ahead.

6 A. Design time or time -- transmission time?

7 Q. Transmission time.

8 A. Oh, no.

9 Q. Because it's mixing?

10 A. No.

11 Q. Why doesn't it cost transmission time?

12 A. Well, mix -- mix or delays would be on the order
13 of tenth of seconds. So it's insignificant time.

14 Q. Now, my understanding of your opinion on
15 Isaksson is that it is equally applicable to coax and
16 unshielded twisted pair. Is that a fair characterization
17 of your opinion about the reference?

18 A. It is.

19 Q. And there is certainly this sentence here that
20 explicitly refers to coaxial cables. Are you aware of
21 any other sentences in Isaksson that explicitly refer to
22 coaxial cables?

23 A. I don't recall discussing others in the
24 declaration. But if there were, I would have discussed
25 them in the declaration.

1 Q. I would have thought so. And I didn't see any
2 in the declaration, and I don't see any in Isaksson. I
3 wasn't -- I just wasn't sure if you were aware of any
4 that did not make their way into the declaration.

5 A. I would have put them in the declaration.

6 Q. We spent a fair amount of time last time talking
7 about sources of noise in networks. Do you recall that?
8 A few months ago.

9 A. Yes.

10 Q. Do sources of noise impact -- do external
11 sources of noise impact signals on a coaxial cable in the
12 same way as they impact signals on an unshielded twisted
13 pair cable?

14 A. What do you mean by "in the same way"? By the
15 same mechanism?

16 Q. Do they have the same impact in the form of
17 degree and type of interference that is created?

18 A. The devil's in the details there. I don't think
19 you can answer that in general. I think -- I understand
20 the question. I just don't think you can answer that in
21 general.

22 Q. Earlier today you had said that 2G cellular
23 networks use QAM modulation. Do you remember that?

24 A. Yes.

25 Q. Are you sure?

1 A. As I recall, they do. As I recall.

2 Q. Are you aware of any disclosure in Isaksson of
3 shielded twisted pair?

4 A. Well, both shielded and unshielded were known at
5 the time of Isaksson, so...

6 Q. For example, PDF page 26 specifically refers to
7 unshielded twisted pair. PDF 29 specifically refers to
8 unshielded twisted pair. I didn't see any descriptions
9 of shielded twisted pair in Isaksson. And I understand
10 that it is your opinion that they were both known, but
11 I'm wondering whether or not there is anything in
12 Isaksson's teachings that suggests shielded in the face
13 of the express disclosure of unshielded?

14 A. Well, he's clearly drawing a distinction between
15 the two, and they're both known. But unshielded has
16 worse characteristics for injection of impairments. So
17 that would be the -- the limiting case. Shielded would
18 only improve his particular design.

19 Q. And when you say "injection of impairments,"
20 that's external noise; right?

21 A. Correct.

22 Q. If you go down to page 25 of your declaration.
23 It's the very end of paragraph 40, but it's on
24 the same page as paragraph 41.

25 A. I'm there.

1 Q. Do you see the image there --

2 A. I do.

3 Q. -- 1.1.3 Digital Access Through POTS Splitters?

4 A. I do.

5 Q. So we've got on the left side two different
6 networks, right, PSTN and a packet network?

7 A. Yes.

8 Q. The bottom is the internet; right?

9 A. The internet is one example of a packet network,
10 yes.

11 Q. And the top is intended to signify the phone
12 network; right?

13 A. Yes, public switch telephone network.

14 Q. And then between the two POTS splitters in the
15 middle, you see a telephone subscriber loop; right?

16 A. I do.

17 Q. And so on that line -- telephone subscriber loop
18 line, there is both internet access and audio-based
19 phone -- audio-based communication happening for the
20 PSTN; right?

21 A. That was the desired service offering for this
22 type of architecture, yes.

23 Q. And this is an A -- well, I guess not. Is that
24 a -- what is the ADSL modem?

25 A. ADSL?

1 Q. So in the figure it says, "ASDL." Is it your
2 understanding that's supposed to be ADSL?

3 A. Yes.

4 Q. So this is a ADSL network that allows the
5 user on the right-hand side to have both internet and
6 phone signals come into their house on the same wire;
7 right?

8 A. Both services, yes. Uh-huh.

9 Q. And those services are divided at the POTS
10 splitter?

11 A. They are.

12 Q. The voice services are provided to the telephone
13 images/pictures?

14 A. Yes. And --

15 Q. And the data services or the internet services
16 are provided down to the ADSL modem?

17 A. Yes. It also says voice band modem, so you
18 could also get digital service over that analog POTS
19 connection.

20 Q. Do you know how that splitter determines what
21 signal to send where?

22 A. It's frequency division.

23 Q. What does that mean?

24 A. It divides the incoming -- just like we talked
25 about splitters earlier, it divides the incoming spectrum

1 from the left side of that POTS splitter that's shown on
2 the right, divides it into two different spectrums, one
3 that goes to the top port and one that goes to the bottom
4 port.

5 Q. So a portion of the spectrum will come out one
6 port, and a different portion of the spectrum will come
7 out a different port?

8 A. Yes. And you could subsequently stack other
9 splitters behind the POTS splitter. So you could --
10 between the POTS splitter and the ADSL -- ADSL modem, you
11 could put another splitter and further divide the
12 spectrum.

13 So you could have multiple digital services, for
14 example, provided over this telephone subscriber loop
15 that are independent of each other.

16 So there's no -- there's no limit as to the
17 number of splitters that could be stacked up downstream
18 on the lower branch of that POTS splitter that's shown on
19 the right side of this diagram.

20 Q. Go back to Isaksson for me.

21 A. Yes.

22 Q. Isaksson refers to a concept called MUSIC,
23 M-U-S-I-C; right?

24 A. Yeah, yes.

25 Q. And that's specific to the installed copper

1 network. It's the IC in MUSIC; right?

2 A. Yes, that was a --

3 Q. It's referring -- what's that?

4 A. That was a research topic. Mostly European
5 universities to develop this sort of technology.

6 Q. And that installed copper was a twisted pair
7 network; right?

8 A. Yes.

9 Q. And so Isaksson's MUSIC protocol is specific to
10 twisted pair, but there are other twisted pairs and other
11 mediums that exist that could provide other similar
12 teachings. That's your opinion; right?

13 MR. AMER: Objection. Vague, misstates
14 testimony.

15 THE WITNESS: I am not sure that question was
16 clear.

17 Q. BY MR. HALVERSON: Sure. Which part was --
18 would you like some clarity on?

19 A. The second half.

20 Q. It's your opinion that there are other mediums
21 beyond the twisted pair of Isaksson's MUSIC protocol that
22 could provide similar teachings or similar functionality
23 as what is described in Isaksson; right?

24 MR. AMER: Objection. Vague.

25 THE WITNESS: Well, MUSIC was a research topic

1 for multiple universities to research this type of
2 service offerings. And Isaksson builds on top of MUSIC.

3 Isaksson didn't invent MUSIC. Isaksson built on
4 top of MUSIC by teaching particular technologies that can
5 be used with MUSIC. So tying Isaksson strictly to MUSIC
6 is too specific.

7 Q. BY MR. HALVERSON: Are you familiar with TDMA?

8 A. I am.

9 Q. Does TDMA require a scheduler?

10 A. Require a scheduler? I'm not sure what you mean
11 by "a scheduler."

12 Q. What does TDMA stand for?

13 A. Time division multiple access.

14 Q. And how does a TDMA system ensure that there are
15 not multiple devices talking over each other?

16 A. They allocate a period of time for the
17 transmitter to talk, to transmit.

18 Q. Who is the "they" there?

19 A. Whoever is controlling the system.

20 Q. So if we refer to that as a scheduler, is that a
21 fair way of describing what they are doing? If you have
22 a better word, I'm happy to use a different word.

23 A. Yeah, a controller.

24 Q. So TDMA requires a controller to allocate time
25 blocks to different devices; right?

1 A. Yes.

2 Q. Are you familiar with CSMA?

3 A. Yes.

4 Q. Does CSMA require a controller to allocate time
5 blocks to devices?

6 A. Yes.

7 MR. HALVERSON: Why don't we take five minutes.
8 I think I might be almost done.

9 THE WITNESS: I'm sorry?

10 MR. HALVERSON: Let's take a five-minute break.
11 I think I'm almost done.

12 THE WITNESS: Okay. Thank you.

13 THE REPORTER: Off the record at 10:39 a.m.

14 (Recess.)

15 THE REPORTER: Back on the record at 10:47 a.m.

16 Q. BY MR. HALVERSON: Dr. Williams, pending
17 anything else from your attorneys, I have nothing else.

18 A. Thank you.

19 MR. AMER: Thanks, Erik.

20 Nothing from us.

21 MR. HALVERSON: Wonderful.

22 Can I get a rough today and a --

23 THE REPORTER: Off the record, Counsel?

24 MR. HALVERSON: I'm happy to, unless you want to
25 put this on.

THE REPORTER: Off the record at 10:47.

(Time Noted: 10:47 a.m.)

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1 STATE OF CALIFORNIA) ss:
2 COUNTY OF MARIN)
3

4 I, LESLIE ROCKWOOD ROSAS, RPR, CSR NO. 3462, do
5 hereby certify:

6 That the foregoing deposition testimony was
7 taken before me at the time and place therein set forth
8 and at which time the witness was administered the oath;

9 That testimony of the witness and all objections
10 made by counsel at the time of the examination were
11 recorded stenographically by me, and were thereafter
12 transcribed under my direction and supervision, and that
13 the foregoing pages contain a full, true and accurate
14 record of all proceedings and testimony to the best of my
15 skill and ability.

16 I further certify that I am neither counsel for
17 any party to said action, nor am I related to any party
18 to said action, nor am I in any way interested in the
19 outcome thereof.

20 IN WITNESS WHEREOF, I have subscribed my name
21 this 27th day of February, 2025.
22

23 
24

25 LESLIE ROCKWOOD ROSAS, RPR, CSR NO. 3462

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Cleveland, Ohio 44114
Phone: 216-523-1313

February 28, 2025

To: Alyaman Amer, Esq.

Case Name: Dish Network LLC v. Entropic Communications LLC

Veritext Reference Number: 7181910

Witness: Tim A. Williams , Ph.D. Deposition Date: 2/26/2025

Dear Sir/Madam:

Enclosed please find a deposition transcript. Please have the witness review the transcript and note any changes or corrections on the included errata sheet, indicating the page, line number, change, and the reason for the change. Have the witness' signature notarized and forward the completed page(s) back to us at the Production address shown above, or email to production-midwest@veritext.com.

If the errata is not returned within thirty days of your receipt of this letter, the reading and signing will be deemed waived.

Sincerely,
Production Department

NO NOTARY REQUIRED IN CA

DEPOSITION REVIEW
CERTIFICATION OF WITNESS

ASSIGNMENT REFERENCE NO: 7181910

CASE NAME: Dish Network LLC v. Entropic Communications LLC

DATE OF DEPOSITION: 2/26/2025

WITNESS' NAME: Tim A. Williams , Ph.D.

In accordance with the Rules of Civil
Procedure, I have read the entire transcript of
my testimony or it has been read to me.

I have made no changes to the testimony
as transcribed by the court reporter.

Date Tim A. Williams , Ph.D.

Sworn to and subscribed before me, a
Notary Public in and for the State and County,
the referenced witness did personally appear
and acknowledge that:

They have read the transcript;

They signed the foregoing Sworn
Statement; and

Their execution of this Statement is of
their free act and deed.

I have affixed my name and official seal

this _____ day of _____, 20____.

Notary Public

Commission Expiration Date

DEPOSITION REVIEW
CERTIFICATION OF WITNESS

ASSIGNMENT REFERENCE NO: 7181910

CASE NAME: Dish Network LLC v. Entropic Communications LLC

DATE OF DEPOSITION: 2/26/2025

WITNESS' NAME: Tim A. Williams , Ph.D.

In accordance with the Rules of Civil Procedure, I have read the entire transcript of my testimony or it has been read to me.

I have listed my changes on the attached Errata Sheet, listing page and line numbers as well as the reason(s) for the change(s).

I request that these changes be entered as part of the record of my testimony.

I have executed the Errata Sheet, as well as this Certificate, and request and authorize that both be appended to the transcript of my testimony and be incorporated therein.

Date Tim A. Williams , Ph.D.

Sworn to and subscribed before me, a Notary Public in and for the State and County, the referenced witness did personally appear and acknowledge that:

They have read the transcript;
They have listed all of their corrections in the appended Errata Sheet;
They signed the foregoing Sworn Statement; and
Their execution of this Statement is of their free act and deed.

I have affixed my name and official seal this _____ day of _____, 20____.

Notary Public

Commission Expiration Date

PAGE/LINE(S) /	CHANGE	/REASON
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[illegible]

Date _____ Tim A. Williams , Ph.D.
SUBSCRIBED AND SWORN TO BEFORE ME THIS _____
DAY OF _____, 20____ .

Notary Public

Commission Expiration Date

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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

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THE ABOVE RULES ARE CURRENT AS OF APRIL 1, 2019. PLEASE REFER TO THE APPLICABLE FEDERAL RULES OF CIVIL PROCEDURE FOR UP-TO-DATE INFORMATION.

VERITEXT LEGAL SOLUTIONS

COMPANY CERTIFICATE AND DISCLOSURE STATEMENT

Veritext Legal Solutions represents that the foregoing transcript is a true, correct and complete transcript of the colloquies, questions and answers as submitted by the court reporter. Veritext Legal Solutions further represents that the attached exhibits, if any, are true, correct and complete documents as submitted by the court reporter and/or attorneys in relation to this deposition and that the documents were processed in accordance with our litigation support and production standards.

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