

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DISH NETWORK LLC,) Case No. IPR2024-00393
) U.S. Patent No. 7,295,518
Petitioner,)
)
vs.)
)
ENTROPIC COMMUNICATIONS, LLC,)
)
Patent Owner.)
_____)

DEPOSITION OF TIMOTHY WILLIAMS

Redwood City, California

Tuesday, October 1, 2024

REPORTED BY: Derek L. Hoagland

CSR No. 13445

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7	Patent Owner.	)	
		)	

Deposition of TIMOTHY WILLIAMS, taken before Derek L. Hoagland, a Certified Shorthand Reporter for the State of California, commencing at 9:05 a.m., Tuesday, October 1, 2024, at Fish & Richardson, 500 Arguello Street, Suite 400, Redwood City, California 94063.

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E X H I B I T S

EXHIBIT	DESCRIPTION	REFERENCED
No. 1004	declaration	7
No. 1001	'518 patent	7
No. 1007	Patent application publication US 2002/0069417	40
No. 1008	Document	57
No. 1009	Document	58
No. 1010	Document	58
No. 1011	Document	58
No. 1012	Document	58
No. 1013	publication number W098/10545	59
No. 1014	US Patent No. 7,127,734 B1	65
No. 1016	Jacobson	70
No. 1005	Document	74

1 9:05 a.m. P R O C E E D I N G S

2

3 MR. HALVERSON: Good morning. Can you state
4 your name for the record, please.

5 THE DEPONENT: Tim Arthur Williams.

6 MR. HALVERSON: Can you spell your last name for
7 us.

8 THE DEPONENT: W-i-l-l-i-a-m-s.

9

10 TIMOTHY WILLIAMS,
11 having first been duly sworn,
12 was examined and testified as follows:

13

14 EXAMINATION

15 BY MR. HALVERSON:

16 Q. And so, Mr. Williams, you have been deposed
17 before?

18 A. Yes.

19 Q. Approximately how many times?

20 A. Over 300.

21 Q. And so I will go over a couple of ground rules
22 before we dive in, first of which is: I will do my best
23 to not talk over you while you're answering if you can
24 do your best to wait for me to finish my question before
25 you start to answer.

1 Is that fair?

2 A. Yes.

3 Q. The court reporter is taking down everything
4 that is said today, and so it's important that we talk
5 slowly and clearly. So please try your best to speak in
6 a manner that allows for a clear transcript.

7 Is that fair?

8 A. Yes.

9 Q. And then you understand that the oath that you
10 just took is the same oath that you would take if you
11 were in court?

12 A. Yes.

13 Q. Is there any reason why you are not able to give
14 truthful and accurate testimony today?

15 A. No.

16 Q. And so I've given you your declaration,
17 Exhibit 1004, and the patent, Exhibit 1001, in front of
18 you there. If at any point in time you think there are
19 other pieces of evidence or documents or things that
20 would be helpful for you to answer my questions, please
21 ask. This is not meant to be tricky. We are truly just
22 trying to understand a few things today. So please do
23 so if you need.

24 Is that fair?

25 A. Yes.

1 (Referencing Exhibits 1004 and 1001.)

2 BY MR. HALVERSON:

3 Q. I'll try to take a break about every hour.
 4 Sometimes I get in a groove and I forget, and so if at
 5 any point in time you need to take a break, use the
 6 restroom, get a drink of water, stretch your legs, what
 7 have you, by all means, go ahead and ask. The only
 8 caveat that I will have on that is, if there's a
 9 question pending, I ask that you answer that question
 10 before we go on break. Is that fair?

11 A. Yes.

12 Q. And so in front of you, Mr. Williams,
 13 Exhibit 1004, do you recognize that document?

14 A. I do.

15 Q. What is it?

16 A. It's my declaration in support of Dish's
 17 petition for inter partes review of US Patent
 18 No. 7,295,518, and it was signed on 15 January 2024 by
 19 me.

20 Q. Have you reviewed this declaration since you
 21 signed it in January?

22 A. Yes.

23 Q. Are there any changes that you would make to it?

24 A. Not at this time.

25 Q. Are you familiar with coaxial cable?

1 A. Yes.

2 Q. What is coaxial cable?

3 A. It's a type of cable.

4 Q. How would you describe it?

5 A. It has -- its construction is typically a center
6 conductor with an insulating material surrounding that
7 central conductor and a shield around that insulating
8 material with another insulating material surrounding
9 that.

10 Q. And in what context have you come across coaxial
11 cable?

12 A. I used it in my home and office, built networks
13 with it. I understand its electrical properties.

14 That's probably a sufficient answer.

15 Q. So when you say you understand its electrical
16 properties, where did you gain that understanding from?

17 A. Graduate school.

18 Q. Where did you go to graduate school?

19 A. University of Texas at Austin.

20 Q. And what graduate degree did you attain?

21 A. Ph.D.

22 Q. Okay. And so I apologize. I called you
23 Mr. Williams. Dr. Williams.

24 A. Everyone calls me Tim, except my mother, who
25 calls me Doctor.

1 Q. All right. Well, I don't need to be lumped into
2 the same boat as your mother, but I will probably call
3 you Dr. Williams today, if that's all right.

4 A. That's fine.

5 Q. And what is your Ph.D. in, Dr. Williams?

6 A. Electrical engineering.

7 Q. And did you get a master's before your Ph.D.?

8 A. I did.

9 Q. From where?

10 A. University of Texas at Austin.

11 Q. And what is that in?

12 A. It's in fields and waves, electrical
13 engineering.

14 Q. And is fields and waves a specialization within
15 electrical engineering?

16 A. It is.

17 Q. What are some of the other, to the extent you
18 can recall, specializations within electrical
19 engineering that existed at the time?

20 A. Graphics, integrated circuits, control systems,
21 computer science.

22 Q. And I forgot to ask, when did you get your
23 Ph.D.?

24 A. I graduated from -- from the University of Texas
25 with my Ph.D. in 1985.

1 Q. And when did you get your master's?

2 A. '81.

3 Q. And before that, did you receive an
4 undergraduate degree?

5 A. I did.

6 Q. And what is that in?

7 A. Bachelor of Science in electrical engineering.

8 Q. And what year?

9 A. 1976.

10 This is all in my vitae.

11 Q. And so did you take any classes that talked
12 about coaxial cables in your undergraduate or graduate
13 education?

14 A. Yes.

15 Q. Did you take any classes that focused solely on
16 coaxial cables in your undergraduate or graduate
17 education?

18 A. No.

19 Q. Other than coaxial cables, what other kinds of
20 mediums, hardware mediums, can transport an electrical
21 signal?

22 A. Copper wire. The ground can transmit an
23 electrical signal. That's probably sufficient.

24 Q. And you said copper wire in response to a
25 question looking for other types of mediums in coaxial

1 cable. What's your understanding of what the conductive
2 core in a coaxial cable is normally made of?

3 A. I would like to append my answer.

4 There's also aluminum wire. There's also tin
5 wire. There's also traces on a circuit board, which are
6 typically copper.

7 Q. So any kind of metal?

8 A. Yes. Conducting surface.

9 I'm sorry. Can I have the question again,
10 please.

11 Q. Yes. So the question was, what's your
12 understanding of what the conductive core in a coaxial
13 cable is normally made of?

14 A. Usually copper.

15 Q. Are you familiar with the term "twisted pair"?

16 A. I am.

17 Q. What is twisted pair?

18 A. It's a pair of wires that are twisted around
19 each other to avoid common mode interference.

20 Q. And are those wires normally insulated against
21 each other, meaning insulation between the two of them?

22 A. Yes.

23 Q. When did you first become exposed to twisted
24 pair wires?

25 A. When I was about -- when I was about 5. So

1 probably 1959. My father was a vice president in AT&T,
2 ran a switching office in my local town, so I used to
3 spend my childhood running up and down the electrical
4 switches in the telephone office.

5 Q. How would you characterize the difference
6 between twisted pair and coaxial cables?

7 A. Different types of medium.

8 Q. Are you familiar with today what the bandwidth
9 capabilities of twisted pair in coaxial cables are?

10 A. Well, when I designed systems for twisted pair,
11 I was very familiar with the frequency characteristics.

12 I guess your question is in regards to the exact
13 specifications of these two different types of media?

14 In general, yes.

15 Q. And are you familiar with what the bandwidth
16 capabilities of twisted pair and coaxial cables were in
17 approximately 2001?

18 A. Yes.

19 Q. And so today, approximately how much bandwidth
20 is available for use on a coaxial cable?

21 A. Of what distance? What type of cable?

22 Q. What are normal carrier distances for a coaxial
23 cable?

24 A. Normal carrier distances. You mean a service
25 provider when you say carrier?

1 Q. When I say carrier, I mean the distance over
2 which a signal can be carried without loss to the degree
3 of degradation beyond usability.

4 MR. BALLANCO: Objection. Vague.

5 THE DEPONENT: It depends.

6 BY MR. HALVERSON:

7 Q. On what?

8 A. How much signal you need to be usable. So
9 there's -- there's a characteristic in cable of
10 attenuation per foot, so how much attenuation can you
11 endure in order to have a usable signal. There's also
12 an attenuation per foot in twisted pair.

13 Q. What is the relative difference between the
14 attenuation per foot of twisted pair versus the
15 attenuation per foot of coaxial cable?

16 A. I don't recall the exact numbers.

17 Q. Do you generally have an understanding of what
18 that relative difference is?

19 A. At what frequency?

20 Q. That's a fair question.

21 What are the normal operating frequencies in an
22 in-home installation of coaxial cable? Is there an
23 upper bound to it?

24 A. Usually it's in the hundreds of megahertz to
25 gigahertz range.

1 Q. What are the normal operating frequencies of an
2 in-home installation of a twisted-pair cable?

3 A. The cable -- the twisted pair install plant in a
4 house can go from the same range.

5 Q. Are you familiar with the term "cat 5"?

6 A. Yeah.

7 Q. Or "cat 6"?

8 A. Yes.

9 Q. What is that?

10 A. It's a designation for a type of -- of cable
11 that passes a particular standard, category 5 standard
12 or category 6 standard.

13 Q. And does that refer to an example of a
14 twisted-pair cable?

15 A. Category 5 -- in order to pass the category 5
16 test, you can be -- you can utilize twisted pair within
17 the cable.

18 Q. Can you pass the category 5 test without using
19 twisted pair?

20 A. Yes.

21 Q. What is an example of a cable that is a cat 5
22 cable that is not a twisted-pair cable?

23 A. I can build a -- a cable that passes the
24 category 5 test without having twisted wires.

25 Q. Is that cable a cable that you would

1 characterize as a coaxial cable?

2 A. No.

3 Q. How would you describe that cable physically?

4 A. The cable I would build?

5 Q. Correct.

6 A. It would have a connector on each end. It would
7 have wire between those connectors.

8 Q. Anything else?

9 A. Insulators.

10 Q. Had anything else?

11 A. That's it.

12 Q. So it does not require any shielding in order to
13 qualify the cat 5 standard?

14 A. No.

15 Q. Has the -- I don't want to say cable industry
16 because that implies delivery of something.

17 How would you characterize the industry that
18 provides wired mediums? Is there a better word than
19 cable industry?

20 A. Wired mediums for what purpose?

21 Q. Transferring a signal from one point to another.

22 MR. BALLANCO: Objection. Vague.

23 THE DEPONENT: I don't know how to answer that
24 question.

25 ///

1 BY MR. HALVERSON:

2 Q. So I'm trying to ask whether or not the cat 5
3 standard has evolved past cat 5. Is there a category 6?

4 A. Yes.

5 Q. Is there a category 7?

6 A. Yes.

7 Q. How high has it gone today?

8 A. I don't recall. I believe there's an 8.

9 Q. Are you familiar with DSL?

10 A. Yes.

11 Q. What does DSL stand for?

12 A. Digital subscriber loop.

13 Q. And where is DSL used?

14 A. It's used in providing services, typically to
15 the home or an office, for digital data.

16 Q. And what kind of -- when you say providing
17 services, what kind of services are provided?

18 A. A good example is Internet access.

19 Q. Are there other services that you're aware of
20 that have been provided over DSL?

21 A. Yes.

22 Q. What?

23 A. Video on demand, voice services, private
24 networking, private videoconferencing, public
25 videoconferencing. Basically, any type of service that

1 we would think of today as a digital service can be
2 provided over DSL.

3 Q. Is video on demand different than live
4 television?

5 A. Yes.

6 Q. What's the difference?

7 A. In my mind. Video on demand is, I want to play
8 this movie down, stream it. And we would use that word
9 today, streaming.

10 Q. And you said play it down. What does that mean?

11 A. I don't think I said play down.

12 Q. "I want to play this movie down"?

13 A. Oh, play this movie from a server that's located
14 somewhere else other than the premises where the video
15 is being observed.

16 Q. So it's a stored file somewhere else, and you're
17 receiving that file?

18 A. Yes.

19 Q. Have you ever seen anybody provide live
20 television over DSL?

21 A. Yes.

22 Q. Where?

23 A. In my offices here in Silicon Valley, we had
24 live feeds between offices using DSL.

25 Q. And when was that set up?

1 A. What year?

2 Q. Yeah.

3 A. Oh, gosh. 19 -- that would be 1998, '99.

4 Q. And so is that different than the private and
5 public videoconferencing that you mentioned a little bit
6 ago?

7 A. No.

8 Q. And so in your mind, is live television the same
9 as a videoconference?

10 A. No.

11 Q. All right. What did I get wrong, then? So you
12 said in response to the services that were provided over
13 DSL, you gave private and public videoconferencing as an
14 example.

15 A. Ah. I was interpreting your question of live
16 video as broadcast video.

17 Q. Got it. And so within the DSL umbrella, there
18 are multiple flavors, for lack of a better word, of DSL.
19 Is that right?

20 A. Standards, yes, mm-hmm.

21 Q. Were you involved in the creation of any of
22 those standards?

23 A. When I was at Motorola in the late 1980s, I
24 architected the Motorola solution for use by telecom
25 companies in delivering ISDN, which was a predecessor of

1 what we call DSL today. And that dealt with the same
2 types of impairments that we're talking about in this
3 case and delivered digital data both from the central
4 office to the point of presence on the side of a house,
5 as well as internal to the house.

6 Q. And just for completeness, what is ISDN?

7 A. Integrated services digital network. So it's --
8 it was a European standard adopted eventually by the
9 TIA.

10 Q. And so in addition to -- I'm sorry. Let me
11 start over.

12 What was that Motorola solution called?

13 A. It was called -- it was called just the ISDN U
14 transceiver and S and T transceivers. It had a part
15 name, but I don't remember the part name. And then just
16 as I was leaving Motorola to do my first startup
17 company, I architected the first version of
18 Motorola's -- of Motorola's DSL solution that became
19 Motorola Gold, I think was the product name. It was a
20 chip for ADSL.

21 Q. And what is ADSL?

22 A. Asymmetric digital subscriber loop.

23 Q. Are you familiar with VDSL?

24 A. Yes.

25 Q. What is VDSL?

1 A. It is a very high-speed DSL.

2 Q. And how would you character -- well, is there a
3 difference between ADSL and VDSL?

4 A. Yes.

5 Q. How would you characterize the difference
6 between those two?

7 A. ADSL is asymmetric, so the download -- download
8 link is higher bit rate than the upload link, and VDSL
9 can be symmetric, and the standards are different
10 between the two.

11 Q. Does VDSL have to be symmetric?

12 A. No. It can be asymmetric.

13 Q. In a VDSL implementation, who decides whether or
14 not the uplink and the downlink are symmetric?

15 A. Service provider.

16 Q. Is there somebody like AT&T? Is that who would
17 be a service provider?

18 A. Or Cox cable or Comcast.

19 Q. Okay. Do you know what types of bit rates are
20 possible over ADSL subscriber line?

21 A. Hundreds of kilobits per second to gigabits per
22 second.

23 Q. And do you know what types of bit rates are
24 available over a VDSL subscriber line?

25 A. The same.

1 Q. And so what does the very high speed of the VDSL
2 afford to the end user over ADSL?

3 A. Well, this is a technology that developed over
4 many, many years, so at any point in time, there were
5 differences in speed and delivery, distance of delivery
6 between the two standards. So eventually, they kind of
7 merged together in terms of capabilities.

8 Q. Do you know when that merger point approximately
9 would have been?

10 A. In the early 2000s.

11 Q. Do you know when work started on developing the
12 ADSL standard?

13 A. Yeah. I know John Cioffi started working on it
14 in the late '80s.

15 Q. And that was ADSL?

16 A. That was DSL, which drove into ADSL. So the
17 fundamental technology was started in the '80s here at
18 Stanford.

19 Q. And then how about specifically for ADSL, which
20 I understand to be a subsequent advancement over a then
21 existing DSL technology?

22 A. It was a different -- different specification of
23 requirements. I think the standards body started, as I
24 recall, '93, '94.

25 Q. And do you -- do you know when the standards

1 body started for VDSL?

2 A. A couple of years after that, as I recall.

3 Q. Do you know who was -- and by who, I mean what
4 types of entities, were responsible for the creation of
5 the standards body for either ADSL or VDSL?

6 A. Well, I believe they're TIA specs, so Telecom
7 Industry Association of the United States, and then
8 CCITT in Europe and the world.

9 Q. I will ask you a couple of questions about the
10 '518 patent, which is 1001 in front of you. You are
11 welcome to use your declaration if that's easier for
12 you.

13 Have you reviewed the '518 patent?

14 A. I did.

15 Q. Approximately how much time did you spend before
16 January 15th of 2024 looking at the '518 patent?

17 A. You're asking me to differentiate between
18 looking at the patent and doing other work on this case?

19 Q. Correct.

20 A. I don't recall.

21 Q. Do you think you spent more than an hour reading
22 the '518 patent?

23 A. Certainly.

24 Q. Do you think you spent more than ten hours
25 reading the '518 patent?

1 A. Certainly.

2 Q. Do you think you spent more than 100 hours
3 reading the '518 patent?

4 A. Probably not.

5 Q. And perhaps I should have asked this earlier, so
6 forgive me for circling back. But you served as an
7 expert witness in a patent proceeding before?

8 A. Yes.

9 Q. Approximately how many times?

10 A. Roughly 300.

11 Q. So of the depositions that you've given, have
12 the vast majority of them been in patent cases?

13 A. I believe every one has been in a patent case.

14 Q. Have you ever been deposed --

15 A. Well, there was a private mediation case, but
16 I -- it was in association with patents.

17 Q. Have you ever been deposed in a patent matter
18 involving your own patents?

19 A. Yes.

20 Q. When was that?

21 A. My first startup company was sold in '96, and in
22 '97, the owner of those patents from that company sued
23 another company. I will keep the names out of it. And
24 a patent that I was, like, the tenth inventor on was a
25 part of that litigation, so I was a fact witness in that

1 particular litigation. So...

2 Q. Other than that one, do you recall any other
3 depositions of patents -- excuse me.

4 Other than that one, do you recall any other
5 depositions of you in a patent case involving your
6 patents?

7 A. No.

8 Q. And so I understand that you have passed the
9 patent bar and are a patent agent. Is that right?

10 A. Correct.

11 Q. When did you take that test?

12 A. Two thousand -- 2001.

13 Q. And why?

14 A. I wanted to understand the rules.

15 Q. Do you prosecute any patents for yourself right
16 now?

17 A. No.

18 Q. Have you ever prosecuted any patents for
19 yourself?

20 A. No.

21 Q. So is it a fair characterization that the taking
22 of the patent bar was an academic curiosity?

23 A. I wanted to understand the rules.

24 Q. Do you understand the rules?

25 A. I did at the time I passed the bar.

1 Q. Have you done anything with that since the early
2 2000s?

3 A. What is that?

4 Q. The patent bar. Have you -- the rules have
5 changed a little bit since 2000. I'm wondering if
6 you've kept up with it.

7 A. I read occasionally.

8 Q. Are you familiar with the American Invents Act,
9 or the AIA?

10 A. Yes.

11 Q. And so are you aware that there were some
12 changes to the patent rules between 2000 and now?

13 A. Yes.

14 Q. This is going to be a blast to the past, so I
15 apologize.

16 Are you familiar with the general agreement on
17 tariffs and trade, GATT, which was a shift in the patent
18 law in the mid '90s?

19 A. I have expressed no opinion on that in this
20 case.

21 Q. Do you remember whether or not when you took the
22 patent bar you were tested on pre-GATT patent rules?

23 MR. BALLANCO: Objection. Scope.

24 THE DEPONENT: I don't recall.

25 ///

1 BY MR. HALVERSON:

2 Q. And so through that process of studying for and
3 taking the patent bar, do you remember learning about a
4 concept called analogous art?

5 A. Yes.

6 Q. What's your recollection or understanding of
7 analogous art?

8 A. That's not something I'm testifying on in this
9 case.

10 Q. You're not offering an opinion about analogous
11 art?

12 A. Not in this case.

13 Q. In the '518 patent, Exhibit 1001, there are a
14 handful of sections or headings in the specification of
15 the patent.

16 I guess before I get into that, are you familiar
17 with what the concept of a specification of a patent is?

18 A. Yes.

19 Q. So when I say "the specification," what's your
20 understanding of what I'm referring to?

21 A. It's the section that -- it's the section other
22 than -- other than the claims in the patent, basically.

23 Q. So the figures in the text?

24 A. Yes.

25 Q. All right.

1 A. Other than the header.

2 Q. And what do you mean by the header?

3 A. United States Patent Block, et al., patent over
4 blah, blah, date of patent, Section 54, 75, 73, 21, 22,
5 63, 60, 51, 52, 58, 56, starting with 57 would be part
6 of the specification.

7 Q. So all the bibliographical background on the
8 cover of the patent from the abstract in the second
9 column of the cover up through the title, and the patent
10 number and other bibliographical information above the
11 top line?

12 A. Yes.

13 Q. Is that --

14 A. The header.

15 Q. The header?

16 A. The header.

17 Q. So in the specification of the patent itself, on
18 page 12 of 1001, in column 1 there's a heading that says
19 "Background."

20 Do you see that?

21 A. I do.

22 Q. And then in the specification -- pardon me.

23 On page 13 in column 4, there is a heading that
24 says "summary of the invention."

25 Do you see that?

1 A. I do.

2 Q. What's your understanding of what the background
3 is doing or describing?

4 A. Setting -- setting the context for the problem
5 to be solved by the patent.

6 Q. What's your understanding of what the summary of
7 the invention is providing?

8 A. An overview of what the invention is intended to
9 do.

10 Q. What's a splitter or a signal splitter?

11 A. It's a piece of equipment.

12 Q. What's it do?

13 A. It has, typically, three ports. The first port
14 is a broadband port. The second and third port are
15 ports to provide signals that are isolated from each
16 other and combine to provide signals to the first port.

17 Q. A lot there to unpack, so bear with me as we go
18 through this.

19 When you say combined to provide signals to the
20 first port, is there a phrase that one would use to
21 describe the first port that would be used to
22 distinguish that first port from the second and third
23 ports in your last answer?

24 A. I don't understand the question.

25 Q. So you talk about your first port that's a

1 broadband port. What do you mean by broadband port?

2 A. A port that -- whose frequency response is
3 capable of supporting the entire bandwidth of the
4 intended solution.

5 Q. Meaning it's not filtering out any aspect of the
6 signal that goes into that port?

7 A. No.

8 Q. So what are you distinguishing when you say
9 capable of supporting the entire bandwidth of the
10 intended solution?

11 A. Exactly that.

12 Q. So the word broadband: Has been used a couple
13 of times by you. What does that mean?

14 A. It's a general characterization of the amount of
15 spectrum available to signals that utilize some
16 facility, in this case the port.

17 Q. And so how much spectrum is needed to qualify as
18 broadband?

19 A. It's -- depends on the particular application
20 that we're talking about. Sometimes broadband is a few
21 kilohertz. Sometimes broadband is gigahertz.

22 Q. What's an example of a context where broadband
23 would be limited to a few kilohertz?

24 A. In very low-speed audio processing, for example.

25 Q. And what's an example of a context where

1 broadband is as wide as multiple gigahertz?

2 A. Cable TV delivery. Broadcast cable TV delivery.

3 Q. In that answer a little bit ago where I said
4 there was a lot to unpack, you also used the phrase
5 "provide signals that are isolated from each other."

6 Do you recall that?

7 A. Yes.

8 Q. What do you mean by signals that are isolated
9 from each other?

10 A. A signal on port 2 at a high level of
11 abstraction does not -- cannot be measured on port 3,
12 and vice-versa.

13 Q. And so is that an out going -- well, I guess --
14 so my understanding of a port is a signal that comes
15 in -- or excuse me. Let me start over.

16 My understanding of the splitter that we were
17 just talking about is a signal comes into port 1 and
18 then is divided between ports 2 and ports 3. Is that
19 correct?

20 A. That's a general explanation, yes.

21 Q. Is there anything incorrect about that general
22 explanation?

23 A. So a signal in your vernacular, a signal comes
24 into port 1 and is divided spectrally into port 2 and
25 port 3. So port 2 gets a certain portion of the

1 broadband spectrum available at port 1. Port 3 gets a
2 portion of the spectrum available at port 1.

3 Q. Are there splitters that divide the entire
4 signal, as in the entire broadband spectrum available in
5 port 1, to both ports 2 and 3?

6 A. That's not a splitter.

7 Q. What would that be called?

8 A. That's a tap.

9 THE REPORTER: Tap?

10 THE DEPONENT: T-a-p, tap.

11 BY MR. HALVERSON:

12 Q. Have you ever heard the phrase "tap port"?

13 A. Yes.

14 Q. What is a tap port?

15 A. Exactly what you just described.

16 Q. So back to isolated signals in splitters,
17 splitters are bidirectional, right?

18 A. Yes.

19 Q. And so when you were referring to how a signal
20 in port 2 cannot be measured on port 3 and vice versa?

21 A. At a high level of abstraction, there is
22 leakage.

23 Q. Is that referring to a signal coming from port 1
24 or a signal going into port 2 that then cannot be
25 measured on port 3?

1 MR. BALLANCO: Objection. Vague.

2 THE DEPONENT: Can I have the question again,
3 please.

4 BY MR. HALVERSON:

5 Q. Sure. So we have port 1 coming in, ports 2 and
6 3 coming out. You said that the --

7 A. So port 1 is an input port. Port 2 and 3 are
8 output ports.

9 Q. The isolated signal that you were referring to
10 was referring to the fact that on port 3 you cannot, at
11 a high level of abstraction, measure the signal on
12 port 2 at port 3, right?

13 A. Correct.

14 Q. And so is that a signal going into port 1 and
15 then out of port 2, or is it a signal going into port 2
16 and then out of port 1 that is not able to be measured
17 on port 3, or both?

18 A. Both.

19 Q. Why is that important?

20 MR. BALLANCO: Objection. Vague.

21 THE DEPONENT: Why is what important?

22 BY MR. HALVERSON:

23 Q. Port isolation.

24 A. Typically, you would use -- in this period of
25 history, you would use a splitter to isolate services

1 from the service provider that are provided according to
2 spectrum. And so in the case of DSL, you have analog
3 voice, plain old telephone service, on the lower ranges
4 of frequencies, and then you'll have the digital data
5 delivery in the higher frequencies, and then that's
6 subdivided between upstream and downstream according to
7 frequency. And so a splitter allows you to isolate the
8 services for a particular piece of equipment according
9 to spectrum.

10 Q. And so what is it about that isolation that is
11 im -- why does -- why does anybody care about that
12 isolation?

13 A. It makes the equipment easier to design, the end
14 equipment.

15 Q. What do you mean by end equipment?

16 A. The telephone handset, the desk set, for
17 example, or the computer modem, for example, or the TV
18 set.

19 Q. And so your answer there --

20 A. I'm sorry. The TV tuner.

21 Q. Refers to both live TV signals as well as
22 telephone signals.

23 Is there anything about a DSL splitter that is
24 unique to port isolation as compared to a coaxial cable
25 splitter as it relates to port isolation?

1 A. Not that I can think of.

2 Q. Are you familiar with the acronym ISI,
3 intersymbol interference?

4 A. Intimately.

5 Q. Wonderful. What is ISI?

6 A. It is interference of a symbol caused by symbols
7 that occurred before in time.

8 Q. And what causes ISI?

9 A. Typically reflections. So you can think of -- a
10 simple analogy is, you can think of a water wave. All
11 waves basically behave the same, water waves, electrical
12 waves, light waves. And so you can think of a water
13 wave propagating through water, and if it -- if it hits
14 the edge of, say, a pool, that water wave will be
15 reflected back into the water. Well, the wave that's
16 reflected back interfering with the next wave that's
17 coming into the wall, that interference is called
18 intersymbol interference in electrical and optical
19 networks, and so the physics of that reflection and
20 interference is intersymbol interference.

21 Q. And so in the pool example, there will be a
22 point in time where the two waves are -- two adjacent
23 waves are superimposed?

24 A. Two subsequent waves.

25 Q. Yeah. So the --

1 A. Not adjacent --

2 Q. -- column 1 and 2?

3 A. -- but subsequent in time.

4 Q. In time?

5 A. Yes.

6 Q. Wave 1 and 2. Wave 1 hits the wall first, wave
7 2 lags by one period of the wave?

8 A. Yes.

9 Q. So there will be a point in time where the two
10 waves are superimposed, right?

11 A. No. There will be a time when the reflection
12 off the wall, the porosity of the wall, has a -- has an
13 effect on how much is reflected. So the entire wave
14 that hits the wall won't be reflected back. Some --
15 some of the energy of the wave will be absorbed by the
16 wall. So there will be a -- a lower amplitude wave, for
17 example, that comes back off the wall, that comes back
18 and is -- will be superimposed on the second wave.

19 Q. And so at that point in time, when the lower
20 amplitude wave 1 has been reflected back off of the wall
21 and is superimposed with the second wave, the amplitude
22 at that instantaneous moment of the combined waves is a
23 combination of the two amplitudes, minus a little bit of
24 a factor, right?

25 A. Yes. Either positive or negative. So it could

1 reinforce or be the detriment of the second wave.

2 Q. And then as that reflected wave travels through
3 the second wave --

4 A. Propagates, yeah.

5 Q. -- there will be a point in time where they
6 will, as opposed to -- let's use your word.

7 A. They either reinforce or they're a detriment.

8 Q. So at the -- at the detriment, you're referring
9 to the increased amplitude of the trough of the wave, or
10 are you referring to the point when the trough of the
11 reflected wave is imposed with the peak of the next
12 wave?

13 A. The peak of the second wave can either be
14 reinforced and go higher or it can go lower.

15 Q. Okay.

16 A. By the reflected wave.

17 Q. I understand what you meant. Got it.

18 A. And that -- that process of reflection and
19 intersymbol interference that we're talking about in
20 electrical waves, which is no different than water
21 waves, that detrimental effect on the second wave causes
22 the receiver that's trying to interpret the information
23 contained in the second wave to have problems and cause
24 errors in the reception for the information on the
25 second wave.

1 Q. And as that reflected first wave passes,
2 propagates off back into the rest of the pool --

3 A. Mm-hmm.

4 Q. -- the second wave remains traveling in its path
5 until it hits the wall, right?

6 A. Mm-hmm. Yes.

7 Q. And so the impact of the reflected first wave on
8 the second wave is a temporary impact. Is that right?

9 A. Yes. That's why people add in their designs a
10 cyclic prefix. So a cyclic prefix is just a pause time,
11 so it lengthens out the time between the first wave and
12 the second wave so that that reflection has time to die
13 out before the second wave comes and hits the wall.

14 Q. And does a cyclic prefix eliminate any concerns
15 from ISI?

16 A. Well, no. These are -- these are -- they're
17 infinite effects to the precision of whatever
18 electronics you're using, but they mitigate the effects.

19 Q. And what can cause a reflection in an in-home
20 coaxial network that would lead to intersymbol
21 interference?

22 A. Any mismatch in impedance between the media and
23 the -- what it -- that media comes in contact with. So
24 you can think of the wall as being a mismatch in
25 impedance.

1 Q. The wall in the pool example?

2 A. Mm-hmm yes.

3 Q. And sticking with the pool example, you also
4 have a mismatch of impedance if there was somebody
5 standing in the pool?

6 A. Yes.

7 Q. Or any other foreign body interacting with the
8 water in the pool?

9 A. To the extent -- we're just talking about
10 reflections?

11 Q. Yeah.

12 A. To the extent that there's another object in the
13 pool or the pool -- the wall splits and goes in two
14 directions, all sorts of obstacles can occur. But
15 there -- to the extent that there is a reflection, that
16 reflection will cause ISI.

17 Now, another type of -- another type of problem
18 that can occur is added noise, and that would be another
19 wave coming in from a different angle into the first two
20 waves and disrupting the first two waves.

21 Q. You're doing your science experiment in the pool
22 and some kids throwing pebbles in the other side and it
23 makes other waves that come in --

24 A. Right.

25 Q. -- and interferes with yours?

1 A. Right. So that would be additive noise.

2 Q. And that additive noise is not ISI, but it can
3 impact ISI. Is that right?

4 A. No. It can impact the receiver's ability to
5 receive the information contained within the waves. So
6 these are impairments of any wave-based communication
7 medium, so water waves, electrical waves, light waves,
8 electromagnetic waves.

9 Q. And do you reduce those impairments by having --
10 or can you reduce those impairments by having fewer
11 devices on the network?

12 MR. BALLANCO: Objection. Vague.

13 THE DEPONENT: I don't understand the question
14 without more specificity.

15 BY MR. HALVERSON:

16 Q. So if I have a coaxial network like the one
17 covered in the patent, there are three splitters there,
18 right, we have got a splitter 230, splitter 232, and a
19 splitter 231?

20 A. Yes.

21 Q. So by having three different splitters in there,
22 as well as all of the other downstream devices beyond
23 the splitters, a series of TVs and modems, I'm adding a
24 lot of opportunities for ISI generation, right?

25 A. Yes.

1 Q. And if I only had two devices, so the network
2 interface 210 goes right into the TV in the middle,
3 there would be fewer devices on that network, right?

4 A. Yes.

5 Q. And so then I would have less ISI because there
6 are less devices there?

7 A. It depends on the reflection coefficient of the
8 TV.

9 Q. So --

10 A. The TV --

11 Q. Go ahead.

12 A. Yeah, the TV might have a worse reflection
13 coefficient.

14 Q. Because there may be much more impedance at that
15 TV?

16 A. Much more impedance mismatch.

17 Q. Sorry.

18 A. Yeah.

19 MR. HALVERSON: We've been going about an hour.
20 Why don't we take a short break.

21 (A recess transpires.)

22 MR. HALVERSON: Welcome back, Dr. Williams. In
23 front of you is Exhibit 1007. Do you see it?

24 THE DEPONENT: I do.

25 (Referencing Exhibit 1007.)

1 BY MR. HALVERSON:

2 Q. What is it?

3 A. This is US patent application publication US
4 2002/0069417 dated 6 June 20 -- 2002.

5 Q. And I have been referring to that as Klieger.
6 Is that a fair way to refer to this document?

7 A. Sure. Sure.

8 Q. Have you read Klieger?

9 A. I have.

10 Q. Approximately how much time have you spent with
11 Klieger?

12 A. Tens of hours.

13 Q. Like the amount of time on the '518?

14 A. I don't know precisely, but in the range.

15 Q. Do you think it's more or less or about the
16 same?

17 A. I don't recall.

18 Q. I would like to, if you would, please,
19 paragraph 4 of Klieger.

20 A. Yes.

21 Q. Second sentence of paragraph 4 says "The
22 evolving standards."

23 Do you see that?

24 A. Yes.

25 Q. Do you have an understanding of what standards

1 those are?

2 A. So this is -- provisional was filed in
3 August 30th, 2000. So he doesn't specify what evolving
4 standards he's talking about here, but he's -- he's
5 referring to either wiring up a new in-premises plant
6 with cable, with coax, or using -- using digital over
7 power line standards that existed at the time or
8 telephony-based DSL standards or -- or WiFi.

9 Q. So I think I'm on board with about 90 percent of
10 that.

11 What in there or elsewhere in Klieger are you
12 looking at and suggests that Klieger is referring to
13 wiring up a new in-premises power plant -- excuse me.
14 Start over.

15 What in there, in paragraph 4 or elsewhere in
16 Klieger, are you looking at that suggests Klieger is
17 referring to wiring up a new in-premises plant with
18 cable, with coax?

19 A. The evolving standards do not appear to take
20 into account the installed base of coax cable. Instead,
21 such standards require the rewiring of homes in order to
22 comply with the evolving -- evolving protocol or the use
23 of other existing media, such as power lines. So that
24 would be digital over power line technology, telephony
25 lines, which would be the telephone-based DSL services,

1 or wireless links, which would be WiFi.

2 Q. And so the first sentence, though, talks about
3 how there's already a coaxial cable present to prevent
4 the viewing of cable television.

5 Do you see that?

6 A. Yes.

7 Q. And so other than the required, the rewiring of
8 homes, is there anything else that suggest the need to
9 rewire specifically with coaxial cable?

10 A. That was one of the options at the time.

11 Q. What other options existed?

12 A. Well, you could rewire -- well, you could use
13 the existing power lines, which he points to as an
14 alternative. You could use the telephone lines, which
15 you could -- which is an alternative. Or you could use
16 WiFi or you could run your own cat 5 in-house plant,
17 either over twisted pair wire or over cable. And, in
18 fact, 2000 -- in fact, I did that in my house in 2000.

19 Q. When you say that, did you run your own cat 5?

20 A. Yes.

21 Q. Over twisted pair or over cable?

22 A. I used both.

23 Q. So the last sentence of this paragraph says:

24 "In comparison to coax, such existing media
25 supports a significantly lower bit rate."

1 Do you have an understanding of what the bit
2 rate of coax was at the time?

3 A. It depends on the standard he's talking about.

4 Q. So as --

5 A. It seems --

6 Q. -- the Klieger uses that -- I'm sorry.

7 Go ahead.

8 A. It seems like it depends on what standard he's
9 talking about. It seems like he's being -- he's writing
10 off the state of DSL at that time, which was approaching
11 a gigabit per second, which is the fastest cable,
12 commercial cable, delivery even today.

13 Q. And so is it your understanding that --

14 A. Sorry. Sorry. Commercial/residential.

15 Q. Is it your understanding that as of
16 approximately 2000, DSL was approaching a gigabit per
17 second?

18 A. Yes. Twisted pair telephony-based DSL.

19 Q. And so the -- have you ever seen the DS -- let
20 meet start over.

21 DSL is used to provide, I think you said a
22 signal to the home for the delivery of digital data,
23 something to that effect?

24 A. Mm-hmm.

25 Q. Is that right?

1 A. Yes, that's what I said.

2 Q. Have you ever seen DSL used within the home, as
3 opposed to the home?

4 A. There are digital technologies associated with
5 data delivery that are applied to the home. For
6 example, the ISDN S&T transceiver that I designed when I
7 worked at Motorola in the 1980s was a digital data
8 delivery over existing telephone plant in the home.

9 Q. And that would be the existing twisted pair
10 wiring within the walls of the home. That's what you're
11 referring to when you say plant?

12 A. Yep. Yes.

13 Q. So paragraph 5 talks about how Klieger meets a
14 demand for interconnectivity without the need to change
15 the physical wiring in the home.

16 Do you see that?

17 A. I do.

18 Q. Why is that a bad thing?

19 MR. BALLANCO: Objection. Vague.

20 THE DEPONENT: It's a good thing.

21 BY MR. HALVERSON:

22 Q. I'm sorry. Why is the --

23 A. It's his -- it's his intended -- oh, it's part
24 of the background of the invention, so it's his intended
25 explanation of the problem that he's going to solve with

1 this particular invention --

2 Q. It was a bad --

3 A. -- that's listed in the claims.

4 Q. It was a bad question.

5 Why is the changing of physical wiring present
6 in the home a bad thing?

7 A. Well, some would say it's expensive.

8 Q. Would some say that that's not expensive?

9 A. I paid the price.

10 Q. Ah.

11 A. I rewired my house.

12 Q. What all did that entail doing?

13 A. Pulling wire, setting up switches.

14 Q. Did you have to remove any drywall?

15 A. Yes.

16 Q. Whole panels or just cutting holes in them?

17 A. Just cutting holes, access points.

18 Q. Did you have to -- other than switches, did you
19 have to add any additional hardware?

20 A. Yes. I put in -- I put in transcoders to go
21 from twisted pair cat 5 to coax cable, and then back
22 from coax cable back to twisted pair cat 5.

23 Q. Why didn't you leave everything on twisted pair
24 cat 5?

25 A. Because there was some existing coax in the home

1 that was unused, and the -- to reach some rooms, I just
2 chose to use coax. I could have used twisted pair.

3 Q. How much did the transcoders cost?

4 A. I don't recall.

5 Q. And why did you select cat 5 as opposed to --
6 I'm sorry.

7 So you chose to use cat 5 for a portion of that
8 in-home plant, right?

9 A. Yes.

10 Q. Why did you choose to use cat 5 as opposed to
11 coax?

12 A. Because the switches were available in cat 5
13 ports.

14 Q. Are there coax switches?

15 A. Yes.

16 Q. Were there coax switches?

17 A. Yes.

18 Q. And cat 5 switches were just more readily
19 accessible?

20 A. Cheaper, faster.

21 Q. What do you mean faster?

22 A. Higher bit per second throughput rate.

23 Q. So same page, next column, paragraph 9 provides
24 a summary of Klieger's signal reflector unit, and it's
25 definitely referred to multiple other places throughout

1 the document. Let me know once you've read paragraph 9.

2 A. I've read it.

3 Q. And so just to align ourselves, Klieger uses the
4 phrase "demarcation point unit." Are you okay if I
5 refer to it as DPU, which I think is the way that
6 Klieger refers to that?

7 A. Yes.

8 Q. Klieger also uses the acronym HNM, which I
9 actually forget what it refers to. Do you recall what
10 HNM stands for?

11 A. Home network module, as I recall. HNM.

12 Q. Are you all right if we refer to that as the
13 HNM?

14 A. Yes.

15 Q. And so paragraph 9 talks about how a component
16 within the DPU signal reflector unit takes a signal off
17 of an upstream frequency and instead -- and then -- not
18 instead, and then applies that same signal to a
19 downstream second frequency.

20 Do you see that?

21 A. "The signal reflector unit returns the home
22 network signal to the plurality of modules of the home
23 network signal having a second frequency." I see those
24 words.

25 Q. How does the signal reflector unit transform the

1 carrier signal from one frequency to another?

2 A. Well, a PHOSITA would normally use a mixer for
3 that.

4 Q. Can you walk me through that process?

5 A. What a mixer is?

6 Q. No, how it -- how Klieger would use the mixer to
7 accomplish the transition from one frequency carrier --
8 excuse me, one carrier frequency to a second carrier
9 frequency.

10 A. Well, again, you'd use a mixer. So do you want
11 me to explain what a mixer is?

12 Q. Sure.

13 A. A mixer is an electrical element that uses a
14 non-linear device -- excuse me -- non-linear device to
15 create a translation in the carrier frequency of an
16 inbound port to an outbound port.

17 Q. Does the bit rate change through the mixer?

18 A. Does the bit rate change through the mixer?

19 Q. Does the bit rate of the -- is the bit rate of
20 the upstream --

21 A. Well.

22 Q. -- different than the bit rate of the
23 downstream?

24 A. At this point, we're looking at analog waves.
25 We're not looking at digital data. So it's hard to

1 answer that question.

2 Q. Does Klieger use the same constellation that is
3 used in the upstream signal for the downstream signal
4 generated by the signal reflector unit?

5 A. You mean the symbol constellation?

6 Q. Correct.

7 A. Is that what you're talking about?

8 Q. Yes.

9 A. Well, typically in what Klieger is talking about
10 there would be no translation of -- of choice of
11 constellations. However, there could be. But I gave
12 you the simplest architecture that a PHOSITA would use.
13 There are other architectures that could translate the
14 constellation.

15 Q. But Klieger does not translate the
16 constellation?

17 A. Klieger is not specific whether he does or does
18 not.

19 Q. And you would agree that the downstream signal
20 coming out of the signal reflector unit is returned to
21 all of the HNMs on the network?

22 A. The signal reflector unit returns the home
23 network signal to the plurality of modules of the home
24 network signal having a second frequency.

25 Q. So does it go to all of the HNMs or a subset of

1 the HNMs?

2 A. Klieger is not specific on that point.

3 Q. In a coaxial network such as that of figure 1 of
4 Klieger that includes a series of splitters, how would
5 the signal coming out of the DPU go to only a subset of
6 the HNMs?

7 A. In this embodiment shown in Figure 1, he
8 labels -- he labels 28 prime and 28 double prime and
9 triple prime, 28, 28 prime, 28 double prime, and 28
10 triple prime. But then he has 24, which just serves as
11 element 33. And he's got duplicitous labels here, but
12 he's got an analog TV hanging off a 24 -- he's got an
13 analog TV connected to 24, which could be just a
14 non-HNM -- let me look at the spec.

15 Q. So --

16 A. I haven't finished my answer.

17 Q. I'm sorry.

18 A. Can I have the question again, please.

19 Q. In a coaxial network such as that of Figure 1 of
20 Klieger, that includes a series of splitters, how would
21 the signal coming out of the DPU go to only a subset of
22 the HNMs?

23 A. Well, Figure 1 is one embodiment. He could have
24 architectures in which the HNMs are part of a different
25 ring that are not connected to element 14 in Figure 1.

1 So you could look at Figure 11. Figure 11 shows the
2 HNMs of one, two, three, and four connected in -- in a
3 ring servicing the different physical IDs, and there
4 could be another backbone within the architecture of
5 HNMs that are entirely resilient to them -- or entirely
6 communicating within themselves.

7 Q. Do you see a DPU in Figure 11?

8 A. D -- you're calling 14 the DPU, correct?

9 Q. Yes.

10 A. The -- Figure 11 shows the interconnection of
11 the HNMs, and those would be serviced by a DPU. What
12 I'm saying is Figure 1 is just an embodiment. There
13 could be another network here to service other nodes.
14 In addition, the servicing of the analog TV doesn't need
15 HNMs, as you can see that in element -- he's got -- he's
16 got multiple labels in it, on different things. The
17 analog TV at the bottom of Figure 1.

18 Q. Klieger describes a transmission power
19 adjustment to overcome signal attenuation, right?

20 A. As I recall, yes. Mm-hmm.

21 Q. Can you look at paragraph 57 for me?

22 A. I've read it.

23 Q. And so the attenuation that is being addressed
24 by the transmission power adjustment at the HNM is the
25 attenuation over the portion of the network between the

1 HNM and the DPU -- or the HRU, I guess is it referred to
2 here?

3 A. Is that a question?

4 Q. I think so. Do you want me to try it again?

5 A. Let me try to answer it this way.

6 Figure 2A shows a physical layer block diagram
7 over a reflector, and so you see -- you see the -- the
8 dock -- the dock flexor over 42 separating low
9 frequencies and high frequencies, and then the band-pass
10 filter isolating the input. An amplifier down converter
11 to a set of filters to perform the mixing is another
12 architecture for a mixer that we talked about earlier,
13 and then upconverting back to a radio frequency and back
14 out the output of the -- of the element 42.

15 So what you would like is the HNMs to arrive at
16 that input point with the same relative power level
17 between HNMs. So some HNMs are connected over 10 feet
18 of -- of media. Some are connected over 100 feet of
19 media. Some are connected over 1,000 feet of media. So
20 there's attenuation per foot in any media, and what --
21 what he's saying is, compensate for that attenuation by
22 turning up the volume of the transmissions that the HNMs
23 have in order to arrive at the input to this mixer with
24 the same relative power level, so the mixer doesn't have
25 to deal with loud signals and -- and quiet signals.

1 Q. And so the attenuation over which -- the
2 attenuation that is being compensated for is the
3 attenuation between the HNM and the mixer?

4 A. Well, the HNM can only measure the downstream
5 attenuation, so the HNM assumes that the downstream
6 attenuation is symmetric with the upstream attenuation.
7 If it is, then it is measuring the same attenuation, but
8 the measurement is only downstream, assuming that it's a
9 symmetric attenuation.

10 Q. And when you use the term "downstream" there,
11 are you referring to the direction towards the HNM?

12 A. Yes.

13 Q. Over a coaxial cable, what would cause
14 asymmetrical attenuation?

15 A. Using different -- different physical cables in
16 downstream and upstream is one way. Having
17 frequency-selective loss in the connectors connecting
18 the HNM to the -- to a single cable, for example, would
19 cause different attenuation frequencies. Selective
20 attenuation would cause different attenuation, so
21 downstream frequencies experience different attenuation
22 than upstream frequencies, which is often the case. So
23 this is really only an approximation of the actual
24 attenuation from the upstream path from the HNM to
25 the -- to the mixer.

1 Q. Does Klieger's power adjustment impact the ISI
2 that we were talking about earlier?

3 A. Yes.

4 Q. How?

5 A. Because if it's -- if an HNM transmits with
6 larger power, there would be more power in the reflected
7 wave.

8 Q. Does Klieger's power adjustment help alleviate
9 any impact of ISI?

10 A. Just so for clarification, you're saying
11 without -- comparing having the power adjustment process
12 in, for example, the network in Figure 1 versus not
13 having the power adjustment process in the network of
14 Figure 1?

15 Q. Correct.

16 A. It depends, I guess is the best answer. So ISI
17 is measured at the receiver when you're trying to
18 determine the actual information that's being carried by
19 the wave. So, for example, the receiver in Figure 1,
20 element 30, triple prime, would be at the -- at the
21 receiver circuitry in the PC modem shown in element 10.
22 I guess 10 is the entire drawing. 30 prime, that PC on
23 the upper right has a receiver in it to demodulate the
24 data that's been placed on the carrier wave. So ISI is
25 only interpreted at that point, so the signal that that

1 receiver sees may or may not be affected by gain
2 settings in different HNMs. It's highly network
3 topology dependent.

4 Q. How would the splitters in the network of
5 Figure 1 impact power attenuation?

6 A. They cause attenuation.

7 Q. Do they cause more attenuation or less
8 attenuation?

9 I'm sorry. Poorly worded question. Let me
10 start over.

11 Over a 10-foot portion of coaxial cable without
12 a splitter as compared to a 10-foot section of coaxial
13 cable with a splitter in the middle, which of those two
14 would have more power loss over that 10-foot span?

15 A. So the -- in the splitter, part 1 is on, say,
16 the left side and you're connecting the downstream cable
17 to port 2.

18 Q. Mm-hmm.

19 A. So in the passband frequencies of port 2, there
20 would be more attenuation than in a straight cable. In
21 the frequencies of port -- of port 3, there would be a
22 lot more because it's rejecting the frequencies of
23 port 3.

24 Q. Can you go to para -- or excuse me, page 23 of
25 your declaration?

1 A. Yes.

2 Q. What are you doing on page 23 of your
3 declaration?

4 MR. BALLANCO: Objection. Vague.

5 THE DEPONENT: What am I discussing?

6 MR. HALVERSON: Correct.

7 THE DEPONENT: I'm discussing relevant portions
8 of Klieger -- excuse me -- Klieger with regards to the
9 element of the claim in the chart.

10 BY MR. HALVERSON:

11 Q. So my understanding is in the left-hand column
12 you have one of Klieger's claims or claim elements, and
13 then in the right-hand column you have some citations
14 and quotations to aspects of the various Klieger
15 provisionals. Is that right?

16 A. In general, yes.

17 Q. Is that --

18 A. I also discuss the specifics back -- further
19 back in the report.

20 Q. I'm curious about the modules that you are
21 describing here. What is a module?

22 A. Can I have dish 1008?

23 Q. You sure can.

24 (Referencing Exhibit 1008.)

25 ///

1 BY MR. HALVERSON:

2 Q. Are you going to want all five, 8, 9, 10, 11 and
3 12, which are all signed in that box?

4 A. I sure am.

5 Q. We'll get them all at once. 8.

6 MR. BALLANCO: And 12.

7 MR. HALVERSON: 9.

8 (Referencing Exhibit 1009, 1010.)

9 MR. HALVERSON: 1008, 1009, 1010, 1011 and 1012.

10 (Referencing Exhibit 1011.)

11 THE DEPONENT: That's 11. There's three copies
12 here.

13 (Referencing Exhibit 1012.)

14 THE DEPONENT: Can I have the question again,
15 please.

16 BY MR. HALVERSON:

17 Q. What is a module?

18 A. Dish --

19 MR. BALLANCO: Objection. Vague.

20 THE DEPONENT: Dish 1008, page 10 says "The data
21 module."

22 "The data module is a device that enables the
23 multiroom networking of data devices such as a PC/PC
24 peripheral and Web TV.

25 ///

1 BY MR. HALVERSON:

2 Q. Do you know what it means to enable?

3 A. Cause to operate.

4 Q. I'm sorry?

5 A. Cause to operate.

6 Q. And so is an example of that the HNMs we were
7 talking about a second ago? Is that what your
8 understanding is?

9 A. Can I have the question again, please?

10 Q. So is an example of that the HNMs we were
11 talking about a second ago? Is that what your
12 understanding is?

13 A. Basically, yes.

14 (Referencing Exhibit 1013.)

15 BY MR. HALVERSON:

16 Q. In front of you is Exhibit 1013, Dr. Williams.
17 Have you seen that before?

18 A. I have.

19 Q. What is it?

20 A. This is an international application published
21 under the PCT. It's publication number W098/10545 dated
22 12 March 1998, to Isaacson.

23 Q. Is it fair to refer to this for the purposes of
24 our conversation today as Isaacson?

25 A. Yes.

1 Q. Would you agree that Isaacson describes a
2 point-to-point network?

3 A. One application of Isaacson is point to point.

4 Q. Are there any other applications of Isaacson?

5 A. Isaacson can be deployed in point-to-multipoint
6 networks.

7 Q. And what part of Isaacson can be deployed in a
8 point-to-multipoint network?

9 A. Multiple NTs could be associated with a
10 networking unit over different frequency spans over
11 the -- over the plant.

12 Q. Would there need to be a multipoint switch in
13 order for that to function?

14 A. Not necessarily.

15 Q. Could you do that with a hub or a splitter? And
16 by that I mean the point-to-multipoint configuration
17 that you're thinking of.

18 A. A hub or a splitter. Not necessarily. It could
19 be done with a splitter or a hub. It could also be done
20 without a splitter or a hub.

21 Q. And how would you distinguish a splitter for --
22 or excuse me. P.

23 How would you distinguish a hub from a switch?

24 A. It depends on the context in which you were
25 talking about.

1 Q. Does a hub support address communication?

2 A. Typically not.

3 Q. Does a switch support address communication?

4 A. Typically.

5 Q. Does a --

6 A. I'm sorry. A TCP/IP compatible ethernet switch
7 does, yes.

8 Q. Does a splitter support address communication?

9 A. Not inherently. Addressed communication can
10 occur over a hub or a splitter.

11 Q. Is Isaacson describing a full duplex connection
12 or a half duplex connection?

13 A. Full. However, Isaacson could easily be adapted
14 to half.

15 Q. How?

16 A. If you look at Figure 6, the spectrum available
17 for transmission is shown. In here, he has ISDN shown
18 in the range of 4 to 150 kilohertz. You could put
19 another upstream or downstream communication module in
20 either of the upstream or downstream frequency
21 allocations.

22 Q. Isaacson describes the need for node
23 synchronization. Why is that node synchronization
24 important for Isaacson?

25 A. Synchronization between the transfer and

1 receiver is important in -- in all communications.

2 Q. Why?

3 A. Because the receiver needs to be able to
4 understand what language the transmitter is transmitting
5 in. If the transmitter is transmitting in German and
6 the receiver is trying to receive in French, it's not
7 going to work. If the transmitter is transmitting in
8 QAM and the receiver is receiving in PAM, it's not going
9 to work so the transmitter and receiver have to be in
10 synchronization in terms of their understanding of what
11 the transmission they're talking and receiving is.

12 THE REPORTER: Can you spell QAM and PAM.

13 THE DEPONENT: Q-A-M and P-A-M, PAM.

14 THE REPORTER: All cap?

15 THE DEPONENT: Yes.

16 BY MR. HALVERSON:

17 Q. Go to page 75 of Isaacson for me.

18 A. Yes.

19 Q. Okay. So under stef --

20 A. I'm sorry. 75.

21 Q. Yeah, I meant that one.

22 A. The native 75?

23 Q. The one with the 75 at the bottom.

24 A. Okay.

25 Q. So describing the generation of a control

1 channel between the transmitter and the receiver here?

2 A. Mm-hmm.

3 Q. That begins on the previous page, and then
4 there's a series of steps beginning on the page that
5 we're on, and it continues for the next couple of pages.

6 A. Yes.

7 Q. So feel free to move around the document is
8 helpful for you.

9 But within step 1, Isaacson says:

10 "The establishment of this channel," the control
11 channel, "is an absolute requirement as further
12 configuration is impossible without a connection between
13 the transmitter and the receiver."

14 Do you see that?

15 A. I do.

16 Q. Why is configuration impossible without that
17 connection?

18 A. Because all communication systems need some
19 element of control channel. In some cases -- in -- in
20 full duplex systems like this, the transmitter and the
21 receiver need to be able to communicate how they're
22 configuring the transmitter and the receiver, and this
23 is the channel that allows them to discuss that
24 configuration.

25 Q. So what kind of things go into that -- all

1 right. Let me start over.

2 What are the things that are being configured as
3 part of that configuration?

4 A. The format of the frame, the timing of the
5 frame, the selection of the constellations within the
6 multi-carrier modulation techniques, for example.

7 MR. HALVERSON: We've been going about an hour.
8 Why don't we take another short break.

9 (A recess transpires.)

10 MR. HALVERSON: Welcome back, Dr. Williams.

11 BY MR. HALVERSON:

12 Q. Sticking in Isaacson for the moment, does
13 Isaacson describe how to maintain a control channel over
14 a splitter?

15 A. Yes.

16 Q. Where?

17 A. A splitter would be in the -- in the
18 transmission path between Isaacson's transmitter and
19 receiver, and Isaacson's design will work over
20 splitters.

21 Q. A slightly different question.

22 So my question was: Where does Isaacson
23 describe how to maintain a control channel over a
24 splitter?

25 A. Isaacson is agnostic as to whether there is a

1 splitter in the transmission path.

2 Q. I'm going to shift gears a little bit. Giving
3 you 1014.

4 (Referencing Exhibit 1014.)

5 BY MR. HALVERSON:

6 Q. Have you seen Exhibit 1014 before?

7 A. I have.

8 Q. What is it?

9 A. It is US Patent No. 7,127,734 B1 dated
10 October 24, 2006, to Amit.

11 Q. Are you fine if we refer to this as Amit or
12 Amit?

13 A. Yes.

14 Q. Will you go to column 13 for me, please?

15 A. Yes.

16 Q. Bottom of column 13, there's a description of
17 what Amit calls the hidden nodes problem.

18 Do you see that?

19 A. Yes.

20 Q. Are you familiar with this concept of hidden
21 nodes?

22 A. Yes.

23 Q. And so how does a system end up in a situation
24 where the iso -- isolation difference between two nodes
25 is different than the isolation difference between two

1 other nodes?

2 A. Can I have the question again, please.

3 Q. How does a system end up in a situation where
4 the isolation difference between two nodes is different
5 than the isolation difference between two other nodes?

6 A. Looking at Figure 6, if we look at nodes that
7 are connected to 618 and 619, those might have a low
8 attenuation between them, or 618 to 624 might have a
9 higher attenuation between them, so 624 would be hidden
10 from 618 and 619. And then using the words from the
11 spec, for example, Figure 7, the communication between
12 703 and 704 might be hidden from 701, in particular when
13 the notch filter 707 does not exist. So seven oh -- 703
14 and 704 are on the right side of Figure 7, and they're
15 downstream of the splitter, 705, and those nodes might
16 be hidden from 701 because of attenuation in the
17 isolation between the taps of the splitters.

18 Q. And are they hidden -- are 703 and 704 hidden
19 from 702 because of the presence of splitter 705? Is
20 that what you're saying?

21 A. In the words of the spec, 703 and 704 might be
22 hidden from 701, in particular when the notch filter 707
23 does not exist.

24 Q. And I'm wondering why they would be hidden from
25 701.

1 A. Because of isolation effects of the splitter in
2 706 and 705. And if 707 is not present, then the -- the
3 frequencies entering 706 will be broader band and those
4 broader band frequencies will be used by 701, 702, 703,
5 and 704 appropriately and not restricted.

6 Q. And is the hiding of 704 from 701 a problem?

7 A. If they can't communicate and they need to
8 communicate, that would be a problem, yes.

9 Q. And why would they not be able to communicate?

10 A. Because they're hidden from each other.

11 Q. And so is it your understanding in Amit that if
12 704 -- I'm sorry.

13 Let me set up a little more predicate first.

14 You had mentioned the presence and absence of
15 notch filter 707 when you were talking about the hidden
16 node aspect of Amit. And so if the notch filter 707 is
17 not present, is it your understanding that in Amit, 704
18 is unable to communicate with 701?

19 A. Directly, yes.

20 Q. And when you say directly, what are you
21 excluding?

22 A. Without the assistance of another piece of
23 equipment.

24 Q. And so we will go -- Amit also talks about
25 something called two-frequency mode. Does that ring any

1 bells?

2 A. Yeah.

3 Q. Go to column 20 of Amit. Let me know when
4 you're there.

5 A. I'm there. I'm there.

6 Q. So two frequency mode in Amit is akin to what we
7 were talking about earlier in Klieger with the upstream
8 versus downstream transition from one carrier frequency
9 to another carrier frequency, right?

10 A. Can I have the question again, please.

11 Q. Dual frequency mode in Amit is akin to what we
12 were talking about earlier in Klieger with the upstream
13 versus downstream transition from one carrier frequency
14 to another carrier frequency, right?

15 A. I don't understand the question. The
16 description in here is complete of what two-frequency
17 mode is. I don't understand your relationship between
18 the two.

19 Q. So in two-frequency mode in Amit, the
20 information is transmitted from an HCNU to another HCNU.
21 Is that right?

22 A. Yes.

23 Q. And there's an upstream frequency that the
24 signal from the first HCNU is carried on, right?

25 A. Yes.

1 Q. And then there's a transition of that frequency
2 from one to another such that the frequency on which the
3 signal arrives at the second HCNU is a different
4 frequency, right?

5 A. There's a translation, not transition. But yes,
6 correct, your question was basically true.

7 Q. And so as a result of that translation from one
8 frequency to another frequency -- I'm sorry.

9 Amit uses that translation from one frequency to
10 another frequency to assist with problems arising from
11 signal reflection in a coaxial network, correct?

12 A. Yes.

13 Q. Would you agree that Amit is a time division
14 agnostic system?

15 A. Where are you reading?

16 Q. I'm presently just looking at column 6, but
17 there is nothing in column 6 that says that.

18 A. Time division multiplexing and time division
19 duplexing can be used in Amit. Amit also uses frequency
20 division, multiplexing, and could use frequency division
21 duplexing.

22 Q. So I'm curious as to the basis for your opinion
23 that time division multiplexing and time division
24 duplexing could be used in Amit. Why do you say that?

25 A. Because it can. Without getting into specifics

1 of an architecture, I don't know how to answer your
2 question.

3 Q. Is there something in Amit that suggests to you
4 that that's possible?

5 A. Amit provides a communication mechanism between
6 a data source and a data sync. That communication
7 mechanism is not restricted in terms of its multiplexing
8 or its duplexing.

9 (Referencing Exhibit 1016.)

10 BY MR. HALVERSON:

11 Q. In front of you now is 1016. Do you see that?

12 A. I do.

13 Q. I have been referring to this as Jacobson. Is
14 that fair?

15 A. Yes.

16 Q. Do you know Krista Jacobson?

17 A. No.

18 Q. Do you know John Cioffi -- Cioffi, excuse me?

19 A. Cioffi, yes.

20 Q. Where did you meet John?

21 A. At Stanford.

22 Q. In school?

23 A. He was in school.

24 Q. What were you doing?

25 A. Running a business.

1 Q. Did he work for you?

2 A. He was an advisor to my first startup company.
3 His brother also worked at my first startup company. I
4 hired his graduate students to work at my first startup
5 company.

6 Q. Were you a member of the National Cable
7 Television Association?

8 A. I believe members are companies, not
9 individuals, of that organization. And no, my companies
10 were never members of that organization.

11 Q. Did you attend the 43rd annual NCTA convention
12 and exposition in New Orleans, Louisiana?

13 A. I don't recall.

14 Q. Have you seen this paper before your work on
15 this case?

16 A. I don't recall.

17 Q. Are you offering any opinions about whether or
18 not this paper is prior art?

19 A. I have been advised that it is.

20 Q. So are you offering any opinions about whether
21 or not this opinion is prior art?

22 A. I'm relying on the advice of counsel that it is.

23 Q. Are you offering any independent opinions about
24 whether or not this paper is prior art?

25 A. No.

1 Q. So in the Jacobson reference, there is, in
2 Figure 2, a depiction of a CATV system diagram.

3 I'm sorry. It's on page 10 of the reference.

4 A. Yes.

5 Q. Do you see Figure 2?

6 A. I do.

7 Q. Do you have an understanding of the power level
8 that the cable TV signal would originate with in the
9 simulation being modeled on Figure 2 as described in
10 Jacobson?

11 A. You mean the transmission power?

12 Q. Correct.

13 A. This paper only mentions zero DB. I don't see
14 any absolute power referenced.

15 Q. Have you ever heard the term "MARC record,"
16 M-A-R-C?

17 MR. BALLANCO: Objection. Scope.

18 THE DEPONENT: No.

19 BY MR. HALVERSON:

20 Q. Have you ever used a MARC record, MARC, to
21 identify a piece of prior art?

22 A. No, not --

23 MR. BALLANCO: Objection. Scope.

24 THE DEPONENT: Not that I recall.

25 ///

1 BY MR. HALVERSON:

2 Q. You said you hired Dr. Cioffi's brother into
3 your first -- I believe you said your first startup
4 company. Is that right?

5 A. And his graduate students.

6 Q. What was that company called?

7 A. Wireless Access.

8 Q. What did Wireless Access do?

9 A. It built protocols, integrated circuits and
10 devices for two-way paging.

11 Q. Two-way paging, like -- like doctors?

12 A. I don't understand the question.

13 Q. What's a two-way pager?

14 A. It is a pager that has the ability to transmit
15 and receive information.

16 Q. Who did you sell two-way pagers to?

17 A. Carriers.

18 Q. What's a carrier?

19 A. A service provider in the two-way paging market.

20 Q. Can you give me an example of one?

21 A. PageNet. Pagemark. MTEL.

22 Q. Those are wireless pagers, right?

23 A. They are.

24 Q. And when did you start Wireless Access?

25 A. 1991.

1 Q. And did you eventually sell it?

2 A. Yes.

3 Q. When did you sell it?

4 A. 1996. It's in my CV.

5 Q. Do you want a copy of it? I'm not trying to
6 test you on it, just.

7 A. Just to the extent that it's important what year
8 it was.

9 Q. That would be fair. I think it's 5.
10 (Referencing Exhibit 1005.)

11 BY MR. HALVERSON:

12 Q. Did any of your startups provide wired
13 solutions?

14 A. Yes.

15 Q. Which one?

16 A. Which two?

17 Q. Sure. Which two?

18 A. BEEcube and BitRail networks.

19 Q. They started in 2006 and 2008 respectively?

20 A. Correct.

21 MR. HALVERSON: I think I might be almost done
22 if we can take a quick break.

23 MR. BALLANCO: Sure.

24 (A recess transpires.)

25 MR. HALVERSON: I have nothing further pending

1 anything from your counsel, Doctor.

2 MR. BALLANCO: I have just a few questions.

3 EXAMINATION

4 BY MR. BALLANCO:

5 Q. Dr. Williams, with your testimony here today,
6 are you intending to withdraw any of the opinions you
7 provided in the declaration you submitted in support of
8 this proceeding?

9 A. No.

10 Q. And do you recall being asked questions
11 regarding analogous art in the context of the GATT
12 treaty?

13 A. Yes.

14 Q. Okay. Would you turn to paragraph 76 of your
15 declaration?

16 A. Yes.

17 Q. And what does this paragraph generally concern?

18 A. Page 76?

19 Q. I'm sorry. Paragraph 76.

20 A. Right here I'm just discussing that a PHOSITA
21 would have looked at Klieger and Isaacson due to the
22 fact that they are from the same field of endeavor and
23 they both present pertinent art to the particular
24 problem at -- being discussed in the '518.

25 Q. Okay. And are you still offering the opinion

1 contained in paragraph 76?

2 A. Yes. I interpreted his question to be more of a
3 legal question.

4 Q. Okay. And just so the record is clear, would
5 you please turn to paragraph 183 of your declaration?

6 A. 183. Yes.

7 Q. And what does paragraph 183 generally concern?

8 A. Just my opinion that Amit and Jacobson are
9 dealing with the same field of endeavor in the same
10 technology in terms of solving a particular problem of
11 the '518 patent.

12 Q. Okay. Are you still offering the opinion
13 presented in paragraph 183 to your declaration?

14 A. I am.

15 MR. BALLANCO: No further questions.

16 MR. HALVERSON: Briefly, I hope.

17 EXAMINATION

18 BY MR. HALVERSON:

19 Q. Stay -- are you still at 183?

20 A. I am.

21 Q. So the next paragraph, you describe what the
22 field of endeavor of the '581 patent is in your opinion.
23 Is that right?

24 A. I do.

25 Q. What is the field of endeavor of the '518

1 patent?

2 A. Wired network systems using coaxial cables.

3 Q. And what did you look at within the '518 patent
4 to come to that conclusion?

5 A. I looked at the entire spec. I also looked at
6 the technical field description in the spec, column 1,
7 lines 25 to 30.

8 Q. Did you look at the title?

9 A. Yes.

10 Q. Did you look at the claims?

11 A. Yes, the entire spec.

12 Q. And the claims expressly require the use of
13 coaxial cable. Is that right?

14 MR. BALLANCO: Objection to the extent it calls
15 for a legal conclusion.

16 THE DEPONENT: Can I have the question again?

17 BY MR. HALVERSON:

18 Q. The claims of the '518 patent expressly require
19 the use of coaxial cable. Is that right?

20 MR. BALLANCO: Objection to the extent it calls
21 for a legal conclusion.

22 THE DEPONENT: Speaking as a -- at least a
23 PHOSITA, I would read claim 4 as requiring coaxial
24 wiring system, which coaxial wiring system may include
25 coaxial cable. Claim 1 only mentions cable wiring. To

1 the extent that there's a claimed construction required,
2 cable wiring could imply coaxial cable or not coaxial
3 cable.

4 BY MR. HALVERSON:

5 Q. In the interest of fairness, keep reading in
6 that claim element.

7 A. Well, cable wiring with a plurality of segments
8 of coaxial cable. So not all the wiring needs to be
9 coaxial cable.

10 Q. But there needs to be coaxial cable in the data
11 network -- data communication network of claim 1, right?

12 A. Present, yes, mm-hmm.

13 Q. You would agree that the abstract of the '518
14 patent also talks about coaxial cable wiring?

15 A. No.

16 Q. What's the first sentence of the extract say?

17 A. Uses coaxial cable wiring, yes.

18 Q. If we go back to your declaration, in that same
19 paragraph, you also talk about the particular problem at
20 issue in the '518 patent.

21 Do you see that?

22 A. Yes.

23 Q. I don't see any citations to the '518 patent in
24 here, so I'm curious as to what it was that you looked
25 at for your qualification of what the particular problem

1 of the '518 patent was. Can you help me out?

2 A. Well, as I testified earlier, I typically look
3 at the background section to lay out the -- the
4 parameters of what the problem is that's going to be
5 solved. So it's in readings columns 1, 2, 3, and 4 that
6 led me to the discussion of the problem being solved.
7 Excuse me.

8 Q. So you identify interference caused due to a
9 multipath environment in this paragraph of your
10 declaration. Is that right?

11 A. Yes.

12 Q. And if you look at the last paragraph of the
13 background -- ah, never mind.

14 MR. HALVERSON: Okay. I have no further
15 questions. Thank you, Dr. Williams.

16 MR. BALLANCO: Nothing further here.

17 MR. HALVERSON: Digital only. Exhibits not
18 attached.

19 MR. BALLANCO: Read and sign. Rough and regular
20 final. Digital only.

21 (Proceeding Concludes at 12:24 p.m.)
22
23
24
25

REPORTER'S CERTIFICATE

STATE OF CALIFORNIA) ss.

I, DEREK L. HOAGLAND, CSR #13445, State of California,
do hereby certify:

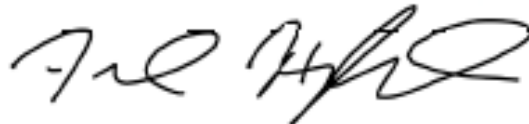
That prior to being examined, the witness named in the
foregoing proceeding was by me sworn to testify to the
truth, the whole truth and nothing but the truth;

That said proceeding was taken down by me by stenotype
at the time and place therein stated and thereafter
transcribed under my direction into computerized
transcription.

I further certify that I am not of counsel nor attorney
for nor related to the parties hereto, nor am I in any
way interested in the outcome of this action.

In compliance with section 8016 of the Business and
Professions Code, I certify under penalty of perjury
that I am a certified shorthand reporter with license
number 13445 in full force and effect.

Witness my hand this October 8th, 2024.



DEREK L. HOAGLAND, CSR #13445

Veritext Legal Solutions
1100 Superior Ave
Suite 1820
Cleveland, Ohio 44114
Phone: 216-523-1313

October 8, 2024

To: Mr. Ballanco

Case Name: Dish Network LLC v. Entropic Communications LLC

Veritext Reference Number: 6899274

Witness: Tim Williams , PhD Deposition Date: 10/1/2024

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: 6899274

CASE NAME: Dish Network LLC v. Entropic Communications LLC

DATE OF DEPOSITION: 10/1/2024

WITNESS' NAME: Tim Williams , PhD

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 Williams , PhD

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: 6899274

CASE NAME: Dish Network LLC v. Entropic Communications LLC

DATE OF DEPOSITION: 10/1/2024

WITNESS' NAME: Tim Williams , PhD

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 Williams , PhD

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

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ERRATA SHEET
VERITEXT LEGAL SOLUTIONS MIDWEST
ASSIGNMENT NO: 6899274

PAGE/LINE(S) / CHANGE /REASON

Date Tim Williams , PhD
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Commission Expiration Date

DISH Network LLC v. Entropic Communications
USPTO PTAB Case: IPR2024-00393
US Patent No. 7,295,518

Errata Sheet of Timothy Williams

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4:20; 70:13,16 72:1 72:10 76:8	“Jacobson” to “Jacobsen”	Typographical error
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30 Oct 2024

Date

Tim Arthur Williams

Tim A. Williams

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Illinois Code of Civil Procedure

Article II, Part E

Rule 207, Signing and Filing Depositions

Signing and Filing Depositions

(a) Submission to Deponent; Changes; Signing.

Unless signature is waived by the deponent, the officer shall instruct the deponent that if the testimony is transcribed the deponent will be afforded an opportunity to examine the deposition at the office of the officer or reporter, or elsewhere, by reasonable arrangement at the deponent's expense, and that corrections based on errors in reporting or transcription which the deponent desires to make will be entered upon the deposition with a statement by the deponent that the reporter erred in reporting or transcribing the answer or answers involved. The deponent may not otherwise change either the form or substance of his or her answers. The deponent shall provide the officer with an electronic or physical address to which notice is to be sent when the transcript is available for examination and signing. When the deposition is fully transcribed, the officer shall deliver to the deponent, at the address supplied,

notice that it is available and may be examined at a stated place at stated times, or pursuant to arrangement. After the deponent has examined the deposition, the officer shall enter upon it any changes the deponent desires to make, with the reasons the deponent gives for making them. If the deponent does not appear at the place specified in the notice within 28 days after the mailing of the notice, or within the same 28 days make other arrangements for examination of the deposition, or after examining the deposition refuses to sign it, or after it has been made available to the deponent by arrangement it remains unsigned for 28 days, the officer's certificate shall state the reason for the omission of the signature, including any reason given by the deponent for a refusal to sign. The deposition may then be used as fully as though signed, unless on a motion to suppress under Rule 211(d) the court holds that the reasons given by the deponent for a refusal to sign require rejection of the deposition in whole or in part.

(b) Certification, Filing, and Notice of Filing.

(1) If the testimony is transcribed, the officer

shall certify within the deposition transcript that the deponent was duly sworn by the officer and that the deposition is a true record of the testimony given by the deponent. A deposition so certified requires no further proof of authenticity

(2) Deposition transcripts shall not be filed with the clerk of the court as a matter of course. The party filing a deposition shall promptly serve notice thereof on the other parties and shall file the transcript and any exhibits in the form and manner specified by local rule.

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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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