UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LENOVO (UNITED STATES) INC.	:	IPR2023-00679
and MOTOROLA MOBILITY LLC,	:	and
Petitioners,	:	IPR2023-00698
vs.	:	Patent Nos.
THETA IP, LLC,	:	10,129,825 B2
Patent Owner.	:	10,524,202 B2

Remote Zoom Videotaped Deposition of

LAWRENCE E. LARSON, Ph.D.

Washington, D.C.

Thursday, April 18, 2024

10:00 a.m.

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Pages 1 - 149

Reported by: Robert M. Jakupciak, RPR

IPR2023-00698
Petitioners Lenovo (United States) Inc.
and Motorola Mobility LLC - Ex. 1018

Videotaped Deposition of LAWRENCE E. LARSON, Ph.D., held at the offices of:

Veritext - Washington

1250 Eye Street, N.W.

Washington, D.C.

Pursuant to Notice, before Robert Michael Jakupciak, RPR, a Notary Public in and for the District of Columbia, when were present on behalf of the respective parties:

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C O N T E N T S

THE WITNESS: LAWRENCE E. LARSON, Ph.D.

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E X H I B I T S

LARSON EXHIBIT NUMBER		PAGE NO.
2005	Larson Declaration	15
2015	Declaration of Lawrence Larson in Support of Patent Owner's Responses	19
1004	European Patent Application No. EP 999,649 A2	21
1001	Patent No: 10,129,825 B2	59
1001-a	'202 Patent marked in the 698 IPR	71
1016	Book entitled Analog Integrated Circuit Design	77
1017	Book entitled RF and Microwave Circuit Design for Wireless Communications	98

(Exhibits attached to transcript.)

P R O C E E D I N G S

Whereupon,

VIDEOGRAPHER: Good morning. We are going on the record at 10:03 a.m. EST on March 18, 2024. This is media unit one of the video recorded deposition of Professor Lawrence Larson, Ph.D., taken by counsel for the Petitioner, in the matter of Lenovo United States Incorporated and Motorola Mobility, LLC, Petitioners, versus Theta IP, LLC, Patent Owner, filed in the U.S. Patent and Trademark Office. Patent Number 10,524,202 B2.

This deposition's location is a Zoom video conference with participants in various locations. My name is Warren Brey, representing Veritext Legal Solutions. I'm the videographer. The court reporter is Robert Jakupciak from the firm of Veritext Legal Solutions.

Counsel please introduce yourselves for the record.

MR. UHR: This is William Uhr from Bookoff McAndrews on behalf of Petitioners.

MR. MELWANI: This is Dinesh Melwani.

Also from the law firm of Bookoff McAndrews.

MR. AHN: This is Sangwoo Ahn, counsel for Petitioners, at Bookoff McAndrews.

MR. MA: Jameson Ma from Bookoff McAndrews.

MR. JOHANNINGMEIER: This is Corey Johanningmeier of Bunsow De Mory, for Theta IP and the witness. And with me on the line is one of our attorneys, Aaron Hand.

VIDEOGRAPHER: And court reporter, please swear in the witness.

Whereupon,

LAWRENCE E. LARSON, Ph.D.,

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

VIDEOGRAPHER: And you may proceed.

EXAMINATION BY COUNSEL FOR PETITIONERS

BY MR. UHR:

Q Good morning, Professor Larson.

A Good morning.

Q My name is William Uhr, and as you may have just heard, I represent the Petitioners,

Motorola and Lenovo, in these two IPR matters.

Have you ever been deposed before?

A Yes, I have.

Q Okay. While you may already be familiar with the procedures, but I'll just run through some preliminaries to make sure we are on the same page.

I'm going to be asking you a series of questions today. The court reporter is going to be taking down every word each of us says. So it's important that we both speak loudly, slowly and clearly so that the reporter is able to hear and understand what we are both saying. That way we will get a complete and accurate record of today's proceeding.

If you wouldn't mind, please allow me to complete my questions in full before you begin your answer. I will extend you the same courtesy and do my best to allow you to complete your answer before I ask the next question.

If you and I interrupt each other, the record will be filled with dashes, which will make the record very difficult to read. The reporter can

only write one person speaking at a time. So it's important that we try to avoid speaking over each other as much as possible.

From time to time counsel for patent owner may object to my questions. Please allow counsel to make his objections without speaking over him. Once counsel has lodged his objection, you are required to provide an answer to the pending question, unless counsel has instructed you specifically not to answer.

Does that all sound okay?

A Yes. That's fine.

Q Okay. When responding to my questions, please give a verbal response, because that's the only type of response that the court reporter can record. The court reporter is not permitted to interpret a nod or a shake of the head and phrases or sounds like uh-huh or huh-uh may be difficult to interpret on the record.

If you do not understand any of my questions, please feel free to ask me to repeat or clarify. I'm happy to do so. And if at any time

you would like to take a break, just let me know. I'm happy to accommodate that. And we understand that we will be breaking at least at 11:45 to about 1:15 today. Does that all sound fair?

A That's perfectly fair. Thank you.

Q Okay. Would you please state your full legal name for the record?

A My full legal name is Lawrence Ernest Larson.

Q Okay. Could you please state your address?

A My address is 97 Condon Street, Providence, Rhode Island.

Q And are you over the age of 18?

A I am over the age of 18.

Q Okay. And do you understand that you are testifying under oath today; correct?

A I understand that, yes.

Q Okay. Did you take any medications or substances that would impact your ability to testify truthfully today?

A No, I have not taken any substances.

Q Okay. Is there anything preventing you from answering questions truthfully today?
A No, there is nothing preventing me from answering truthfully today.
Q Do you recognize the Case Numbers IPR 2023-00697 and IPR 2023-00698?
A Yes, I do.
Q Do you understand that your testimony today relates to these two IPR proceedings?
A Yes. I understand that.
Q Are you currently at home?
A I am at home, yes.
Q Are there other people at home with you?
A Mr. Johanningmeier is sitting across from me here. My wife Lynn is upstairs. That's all.
Q Do you have a reliable Internet connection where you are?
A It's pretty reliable, yes. Every now and then it will slow down once a day, and that may happen some time today and I apologize if it does. Otherwise, it's very reliable.
Q No problem. Thank you for letting me

know. And are you currently communicating with anyone other than me?

A No. I'm not communicating with anyone other than you at this time.

Q Do you have any electronic devices with you other than your laptop?

A I have got my cell phone here. I guess I could turn it off if you would prefer.

Q Could you please turn it off?

A Yes. Sure. Just a second. There we go. Okay. It's turned off.

Q On your laptop do you have any electronic messaging applications or browsers open?

A I actually have Chrome open right now. I will shut it. And I have Internet Explorer open and I will shut that as well.

Q Thank you.

A They are both shut now.

Q Thank you. I would ask that you keep them closed while we are on the record and I'm asking you questions.

A I will. I will keep them both closed.

Q Thank you. Do you have any documents open on your computer?

A No. Not at this time.

Q Okay. Can you affirm that you will not communicate with anyone electronically or otherwise while you are providing testimony on the record?

A Yes. I will not communicate with anyone by any means while we are on the record.

Q Did you bring any documents or notes with you in physical form?

A Well, I have three documents here by my side today that Mr. Johanningmeier provided for me. But I have no notes of any kind.

Q Okay. What are those documents that you have?

A Yes. So the first one is my declaration on these two IPR matters, and that's dated January 29th. And I have two U.S. Patents, the so-called '825 patent and the so-called '202 patent. And those are the three documents that I have right here.

Q Okay. Are there any annotations on those

documents?

A No. Those documents are all completely clean of any markings or annotations.

Q Okay. Dr. Larson, did you prepare for this deposition?

A Yes, I prepared for this deposition.

Q How did you prepare?

A Well, I reviewed my declaration, I reviewed the patents, I reviewed some of the prior artwork, and, you know, various other documents related to the case.

Q Did you review the petitions?

A Those would have been like the -- I believe I did review the petitions, yes. Maybe you would have to show me the document or perhaps Mr. Johanningmeier could show it to me and I could verify that. But I think I reviewed the petitions, yes.

Q Okay. Did you review the declarations that were submitted by Dr. Baker?

A I was presented with them and I reviewed those declarations briefly, yes.

Q And you said that Mr. Johanningmeier helped you prepare for this deposition?
A Yeah. He did help me prepare for this deposition.
Q Did anyone else help you?
A No. No one else helped me with this deposition.
Q Did you have meetings with Mr. Johanningmeier to prepare?
A Do you mean to prepare for this deposition?
Q Yes.
A Yeah. Mr. Johanningmeier traveled to Providence yesterday and we spent yesterday discussing this deposition. So yes, we met as part of my preparation.
Q Roughly how much time would you say you spent preparing for today's deposition?
A Do you mean in total how much time did I spend?
Q Yes.
A I would say 30 to 40 hours in total to

prepare.

Q I'm going to go ahead and introduce an exhibit and I'm hoping that it will be available to you within the Zoom meeting.

(Larson Exhibit Number 2005 was marked for identification.)

BY MR. UHR:

Q Did a file pop up for you?

A No. I'm sorry. It has not popped up for me. If you are trying to do a screen share, I'm not seeing it.

Q No. I'm not trying to do a screen share. I'm trying to share the document with you through the Veritext --

A Ah.

Q -- portal.

A If I have shut my browsers, that may not be possible. Just a thought.

MR. JOHANNINGMEIER: You -- sometimes it works with dropping PDFs into the chat. Let me see if --

MR. UHR: Counsel, do you mind if we went

off the record quickly to get this exhibit situation sorted?

MR. JOHANNINGMEIER: Yeah. Let's do that. We don't need to record ourselves talking about it. That's right.

MR. UHR: Thank you.

VIDEOGRAPHER: We are now off the record at 10:18 a.m.

(Recessed at 10:18 a.m.)

(Reconvened at 10:23 a.m.)

VIDEOGRAPHER: We are now back on the record at 10:23 a.m. You may proceed.

BY MR. UHR:

Q Okay. Dr. Larson, I asked you to reopen your browser to open the Veritext portal; correct?

A Yes. That is correct.

Q And now you are able to see Exhibit 2005?

A I'm able to see it on the Veritext portal and I also have a paper copy here.

Q Thank you for opening the portal. Is this a copy of the declaration you submitted with the patent owner's preliminary responses?

A Yes. This is the document from the preliminary responses that was submitted last summer, summer of 2023.

Q And in the version that I have posted to the portal it is Exhibit 2005, and then it indicates that it is in the proceeding IPR 2023-00698. Did you submit the same declaration in substance in the 697 IPR?

A Hold on one second. And the reason that I -- so you are referring to the 698 and you say that because at the bottom right this particular declaration is labeled IPR2023-00698, and yes, there is a similar one that is IPR2023-00697 that was also submitted, yes.

Q When you say similar, was the text of the document the same except for that stamp in the bottom right corner?

A You know, I would have to review the documents. I think they are very, very substantially similar. Whether they are exactly the same, I would have to review both documents to review that.

Q Okay. Could you look at the first page of this document? It says underneath Theta IP, LLC, Patent Owner, it says three cases, 694, 697 and 698. Do you see that?

A This is on page one.

Q The cover page. Yes.

A The cover page. Yes. Yes. I see that. It says 694, 697, 698.

Q Okay. Does that indicate to you that this document was submitted in all three of those cases?

A Yes, it does. And then there are patents associated with each of those below, the '330, '825 and '202.

Q Have you discovered anything in this declaration that you believe may need to be corrected or clarified?

A Well, you know, once again I would have to review it. I haven't reviewed this document really in detail since it was submitted. And so I think if there has been anything that I would want to change, I would want to take a look at it. But nothing comes to my mind at this time.

Q Okay. And do you believe that this declaration you submitted is still complete and accurate?

A As far as I know, yes. Once again I would probably want to review it in detail, but as far as I can remember it's still complete and accurate.

Q I'm going to introduce another document into the Veritext portal.

(Larson Exhibit Number 2015 was marked for identification.)

BY MR. UHR:

Q Please let me know when that becomes available to you.

A Yes. I'm not seeing it on the screen yet. Let me -- there we go. Now, this one is Exhibit 2015. Is that correct?

Q That's correct. This is previously marked as Exhibit 2015 and this document again has the identifier at the bottom for the 698 IPR.

A Okay. Let me open this. Yes. The cover page says 697 and 698. I'm sorry. It says 698 at the bottom. Thank you.

Q And is this a copy of the declaration you submitted with patent owner's responses?

A I believe that this is also a declaration that I submitted with the patent owner's responses, yes. Let me just check the signature at the final line. Yes. This was from January of this year.

Q That is your signature on page 32?

A That's my signature on page 32, yes.

Q And is it your recollection that you submitted the same declaration in both the 697 and 698 IPRs?

A Yeah. My recollection is that this was submitted for both the 697 and the 698 IPRs.

Q While preparing for this deposition did you discover anything in this declaration that you believed may need to be corrected or clarified?

A No. I have no corrections or clarifications that I would like to put forward at this time.

Q And sitting here today do you still believe that this entire declaration is complete and accurate?

A Yes. Sitting here today I still believe it is complete and accurate.

Q So for our mutual orientation I may refer to your declaration again today during the deposition. And when I say your declaration, I'm going to be referring to this document, Exhibit 2015. If I refer back to your earlier declaration, I will specifically call that your preliminary response declaration or Exhibit 2005. Is that okay?

A Yes. That's fine.

MR. UHR: I'm going to introduce another exhibit. This was previously marked as Exhibit 1004.

(Larson Exhibit Number 1004
was marked for identification.)

A Okay. I don't see it on my screen yet, but Mr. Johanningmeier gave me a paper copy. But I will bring it up on my screen as well.

Q We can give it a second. Just let me know when it becomes available for you.

A Yeah. Sometimes the screen has to refresh. So, yes, I see it here and I see

exhibit -- the screen -- the wheel is spinning, but I do see Exhibit 1004 on my screen.

Q Great. And this is a copy of EP 0999,649 A2, and I may refer to this as the Rauhala reference for short. Do you recognize this document?

A Yes. I do recognize it. I have reviewed it.

Q Can you please look at paragraph 13 of this document?

A So, and just to the clarify, the paragraphs are numbered with bold numbers kind of at the beginning of the paragraph, so I see 0013 and it starts, "Figure 2 shows a", et cetera.

Q Yes. That's correct.

A I see it.

Q So that first sentence says: "Figure 2 shows a similar signal path structure as Figure 1." Do you see that?

A Yes. I see that.

Q Okay. So the Rauhala reference describes a signal path; correct?

A Yes. Well, that sentence describes a

signal path, yes.

Q Okay. And that sentence refers to Figure 2?

A Yes. Let me just take a look at Figure 2 quickly just to confirm this. But -- yes. Figure 2 describes a signal path as described in that first sentence.

Q Still looking at Figure 2 then, do you see toward the left that there is a component labeled with the letters ANT?

A Yes. I see an ANT there on the left in Figure 2.

Q The component labeled ANT is an antenna, correct?

A I believe that's correct, yes.

Q And based on the specification and this reference, that antenna would receive an RF signal; correct?

MR. JOHANNINGMEIER: Objection. Scope.

A Yes. Based on my understanding, that antenna would receive an RF signal.

Q Okay. Do you see the line running

parallel to the bottom of the page from the antenna component through F1, A1, F2, A2, and then through to the block labeled DET? Do you see that line?

A I have to confess I'm a little confused by what you have just described. Could you say that again or maybe try to be a little more descriptive in your, in which line you are referring to?

Q Sure. So do you see that the antenna connects to the block labeled F1?

A Yes. I see that connection.

Q Okay. And then do you see that F1 connects to A1?

A I believe that F1 connects to A1 through that horizontal line that goes between F1 and A1. If that's what you are referring to, yes, I see it.

Q So there's a horizontal line between F1 and A1?

A I see that.

Q Similarly, there is a horizontal line between A1 and F2; right?

A Correct. Between A1 and F2.

Q And is there a similar line between F2 and

A2?

A There is a similar line between F2 and A2, yes.

Q Okay. And is there a similar line between A2 and M1?

A Yes. There is a similar line between A2 and M1.

Q Is there a similar line between M1 and A3?

A Yes. There is a similar line between M1 and A3.

Q Is there a similar line between A3 and F3?

A Yes. There is a similar line between A3 and F3.

Q And is there a similar line between F3 and M2?

A Yes.

Q Similar line between M2 and F4?

A Yes. Between M2 and F4.

Q And a similar line between F4 and DET?

A Yes. Correct.

Q Okay. Now that collection of lines, that's a signal path; correct?

MR. JOHANNINGMEIER: Objection. Scope.

A I would say yes, the signal goes from the antenna through that chain that you just led me through to the, to the final block which is labeled DET.

Q And do you see that there are rectangular blocks, there are four of them, labeled with F and with a numeral next to it?

A Yes. I see those blocks.

Q And those are intended to represent filters; correct?

MR. JOHANNINGMEIER: Objection. Scope.

A Yeah. I believe those are meant to represent filters in the signal chain.

Q Do you see the triangles marked A1, A2 and A3?

A Yes. I see the A1, A2 and A3 triangles.

Q Those triangles are intended to represent amplifiers in the signal path; correct?

MR. JOHANNINGMEIER: Objection. Scope.

A Yes. I believe those are intended to represent amplifiers.

Q And the circles with the Xs through them labeled M1 and M2, do you see those?

A Yes, I see those circles.

Q And those circles are intended to represent mixers within the signal path; correct?

MR. JOHANNINGMEIER: Objection. Scope.

A Yes. Those, M1 and M2 are mixers in the signal path.

Q Rauhala teaches adjusting bias currents of amplifiers and mixers; correct?

MR. JOHANNINGMEIER: Objection. Scope.

A Well, it -- Rauhala teaches adjusting the DC bias of amplifiers and mixers.

Q Could you please look at paragraph 13 again of the same document?

A Yes.

Q And do you see that second sentence beginning with "unit 21"?

A So paragraph 13, the second sentence, yes; "unit 21 includes the linear units, or amplifiers A1, A2 and A3," et cetera. I see it, yes.

Q Okay. And Rauhala is referring there to

the amplifiers and mixers in Figure 2 as linear units; right?

A Right. That sentence says unit 21 includes the linear units of those amplifiers and mixers. Yes.

Q Would you please scroll down to paragraph 21 of the same document?

A 21. Yes. I'm there. The paragraph 21, and paragraph 21 starts with: "Figure 6 shows an example of," et cetera.

Q Okay. So you see the first sentence says: "Figure 6 shows an example of a linear unit's supply current control"; correct?

A Yes. That's the first sentence.

Q Okay. And do you see in the second sentence where it says that linear unit 61 is an amplifier?

A I see that second sentence, yes.

Q And A1, A2 and A3 of the signal path from Figure 2 are all amplifiers; correct?

MR. JOHANNINGMEIER: Objection. Scope.

A Yes. I'll rely on my memory of Figure 2,

but I believe that's correct, yes.

Q Would you agree that the linear units being referred to in paragraph 21 is an example of one of the amplifiers in Figure 2?

MR. JOHANNINGMEIER: Objection. Scope.

A So let me just read the sentence again. We are talking about the second sentence in Figure 21; is that correct?

Q Yes.

A So let me just read it again and then I'll answer your question.

Yes. I believe these refer, the author is referring to the amplifiers in that case.

Q Could you turn to Figure 6 of the same document?

A Yes. I see it here.

Q Do you see that there is a -- there are two portions here shown with dotted lines; one of them is labeled 61 and one is labeled 62?

A Yes. I see that. 61 and 62 in Figure 6.

Q And the portion labeled 61 is the linear unit that we were just discussing; right?

A Well, that's the amplifier, which is I guess the linear unit from Figure 2.

Q Do you see the line extending downwardly from that box labeled 61 and it's got the label I next to it?

A Yes. I see that line connecting 61 and 62 and that line goes into the collector of transistor Q2.

Q What is your understanding of what that I indicates?

A Yeah. My understanding of that I is that it is the DC bias current of the differential amplifier.

Q When the differential amplifier 61 is actively amplifying a signal, you would expect I to be a non-zero value; correct?

A Well, yes. Every time an amplifier -- if an amplifier is going to be amplifying a signal, there has to be some DC current supplied to it to provide the energy for amplification.

Q So if I were zero, differential amplifier 61 would not amplify the signal; correct?

MR. JOHANNINGMEIER: Objection. Scope.

A So if the DC bias current I were zero, the differential amplifier would have no gain. Correct.

Q And what is your understanding of what this portion of Figure 6 labeled 62 is?

A Well, 62 is a circuit that provides a variable DC bias to differential amplifier 61, and that DC bias is controlled by the switches at the top of the circuit, which I guess are labeled Ka and Kb here.

Q If you removed the entirety of the circuits in 62, the value of I on the right side would be zero; correct?

A Well, I'm a little confused by your question and if I might ask, do you mean that, that the circuit 62 is removed and that line that connects the differential amplifier to 62 is simply not connected to anything? Is that what, your question? I'm trying to understand your question.

Q That's my question.

A Right. So if you removed 62 and the line the between 61 and 62 were just unconnected to

anything, then there would be no DC current going through the differential amplifier and there would be no gain.

Q Do you see to the left of the box labeled 61 there are two lines and it says "in" next to those two lines?

A Yes. I see two lines on the left-hand side of 61 labeled "in".

Q And what does the "in" identify?

A Well, presumably the "in" identifies the fact that these two lines represent the input of, the signal input of the differential amplifier.

Q And do you see to the right of 61 where there are two similar lines and next to it it says the word "out"?

A Yes. I see two similar lines on the right-hand side of 61 labeled "out".

Q And what does the "out" identify?

A Presumably the "out" identifies the output signals of the differential amplifier.

Q And they may not be shown here, but you would expect that there are electronic components

between the in and the out; correct?

A Yes. I think my interpretation of the, this box labeled 61 is that there are electronic components in there that perform the function of a differential amplification.

Q And what type of signal would you expect would be received at the in side of 61?

A Once again I'm not quite sure what you mean by the in side of 61.

Q I was referring to the left side where it includes the word "in".

A Right. So, well, I guess the types of signals would be the signals that had been received by the antenna and then passed down the signal chain, and those signals, you know, would be varying frequencies and levels.

Q You said that those signals would have varying frequencies and levels. What do you mean by levels?

A Well, by levels I guess I mean like voltage levels. Voltage levels at the amplitude of the voltage as a function of time.

Q As the frequency of a signal going into the in side of the differential amplifier changes, would that cause the value of I to change?

A As the frequency of the input signals going into the in changes, would I change? And I will assume by I you mean that DC current that is being supplied by Q2 in element 62. It would not -- I would not normally change as the frequency of the inputs change.

Q Would you clarify what you mean when you said would not normally change? Are there some instances where it would change?

MR. JOHANNINGMEIER: Objection. Scope.

A Yeah, I can't think of any when it would, no.

Q Is there a reason that you said normally it would not change?

A The only -- you'll have to remember that I'm a professor and, you know, generally speaking as circuits operate at higher frequencies, more DC current is required. But that's, you know, not really relevant to this particular class of circuits

that we are talking about. So there is no reason that I said normally in this case.

Q And why do you say that it's not relevant to this particular reference?

A Yeah. Because the changes in currents that you might encounters, changes in DC bias currents that you might encounter would be over the range of frequency variation of many orders of magnitude. For example, from ten kilohertz to 10 gigahertz. And that particular range of frequencies is not something that's encountered in wireless communications.

Q I believe you also said that the signals received at the in side of the differential amplifier would have varying amplitudes. Am I remembering that correctly?

A The signals received at the input of the differential amplifier could have varying amplitudes, yes.

Q If the amplitude of that signal were to change, would that cause the value of I at the bottom of 61 to change?

MR. JOHANNINGMEIER: Objection. Scope.

A Yeah. If the, if the amplitude of the input signals varied, the amplitude and voltage of the input signals varied, I would not change.

Q I would not change?

A I would not change.

Q Would you please turn to paragraph 23 of the same document?

A Yes. I see it on the screen here. It starts at -- paragraph 23 starts with, "Figure 7 shows another example of," et cetera.

Q Okay. So that first sentence says: "Figure 7 shows another example of controlling a linear unit's supply current." And do you see that?

A I see that, yes.

Q Okay. And then the second sentence says: "Linear unit 71 is an analog multiplier used as a mixer." Do you see that?

A I see that, yes. Used as a mixer.

Q And with reference to Figure 2, we discussed just a bit ago that the components labeled M1 and M2 are mixers; right?

A Yes. M1 and M2 are mixers in Figure 2.

Q So would you agree that the linear unit 71 that's being referred to in paragraph 23 and appears in Figure 7, could that be one of the mixers M1 or M2 in Figure 2?

A So Figure 7, the circuit in Figure 7 could be used as one of the mixers M1 or M2 in Figure 2. And I'm now looking at Figure 7.

Q Okay. Thank you. That's where I was going next. Do you see that there are two portions shown by dotted lines labeled 71 and 72 respectively?

A Yes. In Figure 7 I see 71 and 72.

Q What is the function of the mixer 71?

A The mixer 71 performs a frequency translation translating a signal at a certain frequency to a signal at a different frequency.

Q Why is that useful in this type of circuit?

A Mixers are useful because we communicate wirelessly at frequencies that are much, much, much higher than humans can process, and so we

communicate at these very, very high frequencies and then we have to translate the information to a lower frequency where humans or our machines can process them. And so this process of frequency conversions is used in wireless devices.

Q Do you see the two lines connecting 71 and 72 and they have the notation I over 2 next to them?

A Yes. I see the two lines. One is on the left and the other is on the right.

Q What does that I over 2 indicate?

A I over 2 indicates a DC bias current supplied by transistors Q1 and Q2.

Q But when the mixer 71 is functioning, both of those I over 2 would have non-zero magnitudes; correct?

A Yes. When the mixer is functioning, those two lines labeled I over 2 would be carrying DC current.

Q And if -- well, I'll refer to the two instances of I over 2 collectively as just I. If I is zero, you would expect that mixer 71 would not operate; correct?

A If I were zero, mixer 71 would not operate.

Q And what is the portion of this figure labeled 72?

A 72 is the DC bias circuit for the mixer. It provides the DC current required for the mixer to operate correctly.

Q If you remove the circuitry shown in 72, I would be zero; correct?

A If you remove the circuit 72 and you left the lines connecting 71 and 72 open, then the mixer would not function correctly and the DC current would be zero.

Q Do you see to the left of the figure the word "signal"?

A I see the word "signal" to the left of the figure, yes.

Q And is that word, does it appear to be associated with two lines?

A Yes. I believe that the word "signal" is associated with two lines.

Q What does "signal" identify there?

A Presumably "signal" is the, you know, the signal received by the antenna travels down the signal chain and when it reaches the mixer, which is one of the M1s or M2s in Figure 2, that's the signal that is referred to here.

Q Is there a reason that you used the word "presumably"?

A It's just a term of art meaning that's normally how things are shown in diagrams like this.

Q So as an expert in the field, you would understand that signal to represent what you just described; correct?

A Yes. Correct. Yeah. This signal represents the signal path, the signal that encounters mixer M1 or M2 in Figure 2.

Q And do you see to the right of 72 where it says "mixer out"?

A I believe you mean to the right of 71. Is that correct?

Q That's correct. Thank you.

A Yes. I see to the right of 71 it says "mixer out."

Q And what does "mixer out" identify there?
A So "mixer out" simply represents the output signal of the mixer.
Q And what kind of output signal would exit the mixer?
A Well, the kind of signal that would output the mixer would be a voltage signal.
Q And there are electrical components between the signal on the left and the mixer out on the right; correct?
A Well, between the signal and, the signal on the left and the mixer on the right, let me say the signal, the middle left and the mixer out on the top right, there are four transistors that are connected to local oscillator out transistors.
Q Are there any other transistors in 71?
A There are two other transistors that are connected to the signal input.
Q Those two other transistors that are connected to the signal, would you understand those to form a mirror?
A So the two transistors that are connected

to the signal, their bases are connected to the signal. I would not characterize those as a mirror, no.

Q Why not?

A Well, the term "mirror" typically refers to two transistors who have the same current, and under -- and not only do they have the same current, but one current forces, one transistor forces the other transistor to have the same current as the first transistor.

In this case these two transistors have the same current but that forcing -- sorry. Let me clarify. They have the same DC current, but one transistor is not forcing the other to have the same current. And then the other thing is that under signal operation they will have different currents. So the two transistors connected to signal, I would not call them mirrors. And I should say whose bases are connected to the signal.

Q And the signal received on the left-hand side at the signal portion of 71 would have a frequency and an amplitude; correct?

A Yes. It will have a frequency and a voltage amplitude. And it could have many frequencies as well.

Q And in normal operation would the frequency change over time?

A It could, yes. Yes. It could change over time.

Q Why do you say that it could?

A Well, well, once again some wireless systems have fixed frequencies and, therefore, if the frequencies are fixed, the frequency won't change. Other wireless systems the frequencies do change and you'll change the frequency then. So this is a system-specific set of conditions.

Q And what is your understanding of the type of system that this mixer would be used in based on the disclosure of Rauhala of this reference?

MR. JOHANNINGMEIER: Objection. Scope.

A Well, I would probably want to read -- I have it in front of me here and, you know, I would imagine that the frequencies would potentially change with the Rauhala circuit as described.

Q Could you look at paragraph one of the same document?

A Yes. I have it right here in front of me. I have got Figure 7 and I have got paragraph one at the same time. So I have paragraph one in front of me.

Q Thank you for bearing with me. I know that I'm moving around. But I will do my best to try to not have you answer questions about two portions at one time. But looking at paragraph one, second sentence, it says: "The invention can be advantageously applied in the reception circuits of mobile stations."

What does that indicate to you?

A Yes. I see that paragraph and I see the sentence. And that to me indicates a radio receiver that would have to tune over a wide range of frequencies as it, as the receiver itself moves throughout the mobile environment.

Q So coming back to Figure 7, would you expect that the signal encountered by mixer 71, the frequency of that signal would change over time?

A Yes. In the context of this disclosure, I would expect that it would vary over time.

Q And would a change in the frequency impact the magnitude of I here?

A Changing the frequency at the input of the signal input would not change I.

Q Okay. And would you expect that the voltage amplitude of that signal input would change over time?

A I would expect the voltage amplitude would change over time at the signal input, yes.

Q If the voltage amplitude changes over time, would that impact the magnitude of I?

A Changing the voltage amplitude over time would not affect I.

MR. JOHANNINGMEIER: Counsel, when you get a chance, can we get a five-minute bio break?

MR. UHR: Yeah. I have got just a couple questions here.

MR. JOHANNINGMEIER: That's fine.

BY MR. UHR:

Q Okay. Dr. Larson, is it your view that

the claims of the '825 patent and the '202 patent that are at issue here do not read on using a control circuit to adjust a bias current for an amplifier?

MR. JOHANNINGMEIER: Objection. Scope. Form.

A So could you repeat your question? I'm sorry.

Q Yes. Of course. Is it your understanding that the claims of the '825 patent and the '202 patent that are at issue here do not read on using a control circuit to adjust a bias current for an amplifier?

MR. JOHANNINGMEIER: Same objection.

A Yeah, and you used this term "the claims read", and that has a, perhaps a legal. Do you just mean do the claims state this or imply this? Could you maybe clarify what you mean by that word "read" a bit?

Q Do the claims cover, substitute cover for read?

A So --

MR. JOHANNINGMEIER: Objection.

A Yeah. So the claims in the '825 and the '202 cover or describe changing bias currents in response to signal and interference conditions.

Q Do they cover changing bias currents using a control circuit?

MR. JOHANNINGMEIER: Objection. Form.

A Well, I guess I would like to review the claims that you are talking about, in particular, in the use of the word control circuit in particular. The '825 and '202 patents describe controlling bias currents in response to signals and interference and those would be controlled using a circuit of some kind.

MR. UHR: Okay. Counsel, we can take a five-minute break.

MR. JOHANNINGMEIER: Yeah. A short break.

THE WITNESS: Thank you. Yes.

VIDEOGRAPHER: We are now off the record at 11:18 a.m.

(Recessed at 11:18 a.m.)

(Reconvened at 11:25 a.m.)

VIDEOGRAPHER: We are now back on the record at 11:25 a.m. You may proceed.

BY MR. UHR:

Q Could we turn to your declaration, Exhibit 2015?

A Yes. And I will bring it up on my screen. I have it.

Q Can you please turn to paragraph 54?

A I have it here. Yes.

Q Do you see the third sentence of that paragraph? It says: "Impedance is often symbolized with Z," and then you provide a formula for Z?

A Yes. I see that sentence.

Q In that formula for Z, R represents resistance; correct?

A Yes. R is resistance in that formula.

Q A resistor in a circuit would have a resistance; right?

A A resistor in a circuit would have a resistance, yes.

Q Thank you for indulging me there. Are there other components of a circuit that would have

a resistance?

A Well, in an impedance there are some other circuits that could have resistance within them, and an example of that might be an antenna. An antenna will have a resistive, resistance component of its impedance as well as a reactive component.

Q Are there other types of components that would have a resistive component other than impedance?

A Another example of a circuit that might have a resistive component to its impedance would be a diode.

Q But in the formula for Z, X sub L represents inductive reactance; correct?

A Yes. X sub L is inductive reactance.

Q And there would be an inductor in a circuit that would have an inductive reactance; right?

A An inductor would have inductive reactance, correct.

Q Are there other kinds of components of a circuit that would have an inductive reactance?

A Well, I mentioned antennas earlier and an antenna can have an inductive reactance component to it.

Q You mean it can have. When would it have an inductive reactive component?

A Well, antennas are designed -- you are asking a question that depends on the physical design. The answer depends on the physical design of the antenna. And all I really meant by my answer was that the, an antenna has a real component to its reactance, which you called resistance, and then it has imaginary component to its reactance, and if that imaginary component is positive, it's called inductive reactance. If it's negative, it's called capacitive reactance. And whether a particular antenna is inductive or capacitive will depend on its physical design and there is no general answer to that question.

Q So an antenna may have an inductive reactance and it also may not have an inductive reactance?

A Yes. That is true. It may or may not

have an inductive reactance.

Q What is inductive reactance?

A Well, as I answered previously, an inductance is an AC or small signal quantity that represents the, you know, push-back against current flow or the ratio of the voltage to the current in the circuit, and that quantity, the reactance, is a complex quantity.

It has both real and imaginary mathematical components. And those mathematical components -- sorry -- those, the real component is called the resistance of the impedance and the imaginary component is called the reactance.

And if that imaginary quantity is positive, we call it inductive. And the reason that we do that is that an inductor, when you measure its reactance, it's purely positive imaginary. So we association that positive value of the imaginary component with an inductor, hence we call it inductor.

And then conversely a capacitance has a negative imaginary, purely negative imaginary

impedance, and so any impedance that has negative imaginary component is called reactance, capacitive reactance.

Q In the formula for Z that you provided, X sub C represents capacitive reactance; correct?

A Yes. X sub C is capacitive reactance.

Q Is capacitive reactance the same as capacitance or is it different?

A Well, typically it's different. And the difference is that capacitance usually has units of Farads, F-A-R-A-D-S. Whereas reactance has units of Ohms. And Ohms is spelled O-H-M-S. So capacitance and reactance are, have different units, they are different.

Q Is the only difference the units?

A Well, the difference in the units represents a very fundamental difference, which is that a capacitance represents the physical capacitor over the physical charge storage of a device, whereas the reactance is a more abstracted quantity related to impedance. And so you can derive reactance from capacitance and you can -- well, you

can derive reactance from capacitance, but they are fundamentally different things.

Q And a capacitor in a circuit would have a capacitive reactance; correct?

A A capacitive in the circuit would have capacitive reactance, yes.

Q And it would also have a capacitance?

A A capacitor in a circuit would also have a capacitance, yes.

Q And are there other types of components other than a capacitor that could have a capacitive reactance?

A Well, I mentioned the antenna as one example earlier and another example is a diode.

Q Does a diode always have a capacitive reactance?

A Under reverse bias operation a capacitor has a capacitive reaction, a reactance.

Q Are there components of circuits that have no resistance?

A The only components of a circuit that have no resistance are superconducting circuits and

that's not at issue here.

Q But in the -- in the formula you provided for Z, R could be zero if you had a superconductor; right?

A R could be zero in the case of a superconductor, yes.

Q And there are components that do not have an inductive reactance; correct?

A Yes. There are components that will not have an inductive reactance.

Q So for those components the X sub L in the formula for Z would have a value of zero; right?

A That's correct. Yes. For circuits that have no inductive reactance, X sub L would be zero in this equation.

Q And there are other components that have no capacitive reactants?

A Yes. There can be components that have no capacitive reactance.

Q But when a circuit has components and none of the components have a capacitive reactance, X sub C would have a value of zero; right?

A X sub C would have a value of zero, yes, if there is no capacitive reactance.

Q And looking again at the formula you provided for Z, you could still calculate, you could still calculate the value for Z if any of R, X sub L or X sub C are zero; correct?

A So I think you are asking if any one of R, XL or XC is zero, could you still calculate Z, and the answer to that is yes.

Q Would your answer change if two of those variables were zero?

A No. My answer would not change if two were zero.

Q Can you look back at the Rauhala reference that's Exhibit 1004?

A Yes. I have a paper copyright here and I will bring it up on the screen. Okay. I have it.

Q Okay. Please go to Figure 6 and let's look at that again.

A Yes. I have it here in front of me.

Q And do you see the rectangles in the top left corner labeled R1, R2 and R3?

A Yes. I see these.
Q Those are resistors; correct?
A Yes. They are resistors.
Q And do you see the labels Kb and Ka above two of those resistors?
A Yes. I see Ka and Kb.
Q Those are switches; right?
A Yes. I believe they are switches.
Q Below the resistors do you see the label KI next to the downward pointing arrow pointing to Q1?
A Yes. I see KI. Yes. It's right above transistor Q1.
Q And KI is the total current flowing from the resistors; right?
A Yes. KI is the total current flowing through all those resistors.
Q And do you see the components labeled Q1 and Q2?
A Yes. I see Q1 and Q2.
Q Those are transistors; right?
A Those are transistors, yes.

Q And together those transistors Q1 and Q2 form a current mirror; correct?

A Q1 and Q2 form a current mirror, yes.

Q Would you please navigate to paragraph 22 of this document?

A Okay. I'm on paragraph 22. It starts: "In Figure 6, the supply current control", et cetera.

Q And the rest of that sentence says: "The supply current control circuit 62 is realized with bipolar transistors."

Do you see that?

A I see that, yes.

Q So Rauhala is saying that Q1 and Q2 can be bipolar transistors; right?

A Yes. Rauhala is saying they can be bipolar transistors.

Q Okay.

MR. UHR: Counsel, I think we wanted to stop at 11:45, and before I jump to a new exhibit, I think this is a good time to break.

MR. JOHANNINGMEIER: All right. Thank you

for accommodating us on that.

THE WITNESS: Thank you very much. We really appreciate it.

MR. JOHANNINGMEIER: Of course.

VIDEOGRAPHER: We are now off the record at 11:43 a.m.

(Recessed at 11:43 a.m.)

(Reconvened at 1:17 p.m.)

VIDEOGRAPHER: We are now back on the record at 1:17 p.m. You may proceed.

BY MR. UHR:

Q Thank you. Dr. Larson, understanding that you are in the same room with Mr. Johanningmeier, did you two discuss the merits of this case during the break?

A No. Not at all.

Q Okay. Thank you. Earlier this morning I asked you a question about what the claims of the '825 patent and the '202 patent cover, and I won't hold you to this, but my recollection is that you said you would like to look at the claims of those patents before you provided an answer.

So I'm going to go ahead and introduce the '825 patent here. And that was previously marked as Exhibit 1001 in the 697 IPR. And that should be coming up in the portal shortly.

A Okay. And I have a paper copy here as well. But I'll refer to the portal copy as much as possible.

(Larson Exhibit Number 1001 was marked for identification.)

BY MR. UHR:

Q Okay. Thank you.

A We are almost there. The little circle is still spinning.

Q No problem.

A It just came up. I have the '825 patent in front of me.

Q Okay. Would you scroll down to the bottom of page 24, and that's the bottom of column 12 where claim one starts?

A Yes. Okay.

Q And is it your understanding that claim one is at issue in the 697 IPR?

A I would have to review my notes on that about claim one in particular. But I'll take it that that is correct if that's what you say. I just don't remember every specific claim of every patent.

Q Okay. I understand.

A So I have it in front of me here.

Q Now, is it your view that claim one does not cover using a control circuit to adjust a bias current for an amplifier?

MR. JOHANNINGMEIER: Objection. Scope.

A Well, when you read claim one, and let's kind of -- let me pull the whole claim up here.

Q Please feel free if you would like to read through the claim, feel free to take your time.

A Yeah. Give me a moment to read through the claim to refresh my memory.

Q Sure.

A Claim one talks about, you know, receiving a wireless signal, you know, with, you know, a plurality of circuits, which we discussed earlier this morning, and measurements of an interfere signal and a, and an interfere signal and a desired

signal, and then, you know, determining bias current variation based on that information.

Now, you asked about is there a control circuit that performs that. You know, the claim doesn't mention control circuit by name, but presumably that determination, some circuit would determine the relative levels of the signal and the desired signal and interference signal and then make those adjustments as required. So there would be some circuit that would do that, but it's not called a control circuit in the claims.

Q It's your view that claim one covers making that adjustment at least with a control circuit?

MR. JOHANNINGMEIER: Objection.

A Yeah. I would say that it makes that adjustment with the circuit that controls the bias currents. And if you want to call it a control circuit, that's, that would be okay. But that's not what the claim actually says, but it's implied perhaps.

Q Okay. And that would -- scratch that.

Your answer would apply to changing a bias current in an amplifier, correct, using a control circuit?

MR. JOHANNINGMEIER: Objection.

A And I'm sorry. Are we still talking about claim one here?

Q Yeah. Claim one.

A Yeah. So, you know, claim one talks about a plurality of circuits. An amplifier, you know, certainly would be one of those whose bias current could be controlled.

Q And does claim one cover adjusting a bias current for a mixer using a control circuit?

MR. JOHANNINGMEIER: Objection. Scope.

A Well, at the very beginning of the claim, you know, the claim refers to a plurality of circuits, including an amplifier, filter and a mixer. And certainly the amplifier and the mixer could have variations in their DC bias currents in response to the various signal conditions that are described in claim one.

Q And the variations in the DC bias current for the mixer could be controlled by a control

circuit according to claim one?

MR. JOHANNINGMEIER: Objection. Scope. Legal conclusion.

A Yeah, I mean they would be controlled by some circuit with some, you know, algorithm in it that would determine the relative signal strengths and then make bias current determinations.

Q Okay. How about if we look at claim three of the same patent.

A Okay. I see claim three here.

Q Would your answers be the same for claim three?

MR. JOHANNINGMEIER: Objection.

A If you don't mind, let me just spend a moment reading claim three rather quickly to refresh my memory.

Q Please. Take your time.

A Thank you. So I'm sorry. So I have read claim three. Thank you. Could you repeat your question, please?

Q Sure. Is it your view that claim three of the '825 patent does not read on using a control

circuit to adjust a bias current for an amplifier?

MR. JOHANNINGMEIER: Objection.

A Well, I would say that as in claim one -- I'm looking for the relevant -- so like claim one, claim three talks about measuring desired and interfering signal strengths with these components, you know, the plurality of circuits, amplifiers, mixers, filters, and then adjusting the bias current in accordance with those measurements, and that adjustment would be of course calculated and achieved by some kind of a circuit in the, you know, in the transceiver.

Q Okay. And still for claim three, does your answer change at all if it's a mixer instead of an amplifier?

A No. My answer would not change if it's a mixer instead of an amplifier.

Q Could you please take a look at claim four? And I'm going to ask you the same question here, so feel free to read through claim four.

A Yes. I have claim four here in front of me and I've read it.

Q Okay. Is it your view that claim four of the '825 patent does not cover using a control circuit to adjust the bias current for an amplifier?

MR. JOHANNINGMEIER: Objection. Scope and form. Legal conclusion.

A Yeah, well, claim four is a dependent claim to claim three and it talks about a change in the bias current in a similar manner to what was described in claim three, which is, you know, a measurement of interfering and desired signals and then making a change in the bias current based on that measurement, and that change would be, you know, calculated by some circuit, some additional circuit in the transceiver.

Q It would be calculated by some circuit and would it also be, would the current change -- strike that.

Would that same circuit also cause the current to be changed?

MR. JOHANNINGMEIER: Objection. Scope. Calls for a legal conclusion.

A And I'm sorry. Could you repeat the

question?

Q Yeah. You said that the bias current would be calculated by some circuits and what I'm asking is if the same circuits would also change the bias current in addition to performing that calculation?

MR. JOHANNINGMEIER: Objection. Scope. Incomplete hypothetical.

A Yeah, I mean I think, you know, absent a specific hardware implementation it's a little hard to say, but certainly that circuit that's doing the calculation would send a signal, I would imagine would send a signal to some other circuit that would literally change the bias. So there is a causal connection here between that calculation of the new required bias and the change in the bias and that's all done with various circuit configurations.

Q Okay. I understand that you are thinking in terms of circuit configurations. What I'm wondering about is what your view is of what claim four covers and I want to know whether claim four covers making the calculations for the bias current

in a circuit and then actually adjusting the bias current in that same circuit?

MR. JOHANNINGMEIER: And, counsel, I mean I have to object here because you are literally asking him what a claim covers which is outside the scope of his declaration and a legal conclusion. There is only so much of this before I'm going to start objecting more strongly. Like this is not germane, it's not relevant to the declaration. Don't ask him legal conclusion questions. So I object to the entire line.

MR. MELWANI: Counsel, speaking objections are not permitted in an IPR deposition.

MR. JOHANNINGMEIER: It wasn't a speaking objection. It was me threatening to call the court if this goes on for too long. Ask questions about the content. Don't ask him questions about what the claims mean or we are going to have a problem. All right?

MR. MELWANI: You are welcome to call the PTAB, but unless you give an instruction not to answer based on privilege --

MR. JOHANNINGMEIER: I'm not giving an instruction. I'm making an objection.

MR. MELWANI: You can continue to make your objection.

MR. JOHANNINGMEIER: Uh-huh.

A So I do want to answer your question. If you could maybe give it to me one more time just so I'm super clear?

Q Does claim four cover adjusting a bias current in an amplifier using a control circuit?

MR. JOHANNINGMEIER: Same objection.

A I would say that claim four talks about changing the bias current, you know, in response to these varying signal conditions that we discussed in claim three. I think, I believe that answers your question.

Q The one part of my question that I don't think has been answered yet is whether that is, that bias current is changed by a control circuit.

A Well, I think that the -- let's use your term a control circuit. A control circuit will cause the bias current to be changed. I mean I'm

not sure that I understand the distinction that you are trying to make here. This control circuit as you call it causes the bias current to be changed. And does it change -- I'm not sure what the distinction is between causing it to change and changing it. I honestly don't understand that distinction.

Q That's okay. I'm not trying to draw that distinction. So let's keep moving forward. And lastly, could you look at claim eight, please?

A Yes. Okay. I've got it right here.

Q And please feel free to take your time reading through claim eight.

A Okay. Give me a minute here. Okay. I've read claim eight.

Q Same question here. Is it your view that claim eight of the '825 patent covers using a control circuit to adjust a bias current for an amplifier?

MR. JOHANNINGMEIER: Same objections.

A So as with the previous claims, you know, this claim eight describes a transceiver with a

variety of components and circuits for measuring desired and interfering signal strengths and adjusting bias currents in the plurality of those, one or more of those circuits and that adjustment is calculated with a circuit, you call it a control circuit, and that, the operation of that circuit causes those bias currents to be changed.

Q Okay. And that was your answer for an amplifier; correct?

A Yes. Yes. That's my answer for an amplifier.

Q And if you substituted an amplifier for a mixer, same question, would your answer change?

A My answer would not change for a mixer.

Q I'm going to put in another exhibit here. Actually, before I do that I'll just clarify. The '825 patent was marked as Exhibit 1001 in the 697 patent and for ease if I go back to the '825 patent, I will refer to it as the '825 patent. If that's okay with you?

A Yes. That's easier for me as well.

Q Sure. I'm going to introduce a new

exhibit here. And this exhibit was previously marked 1001 in the 698 IPR. And this is the '202 patent.

A Thank you. I have a paper copy of that here and but I will try to refer to the screen version once it appears.

(Larson Exhibit Number 1001 was marked for identification.)

BY MR. UHR:

Q Just let me know when it appears on your end. I don't have a problem with you referring to the paper copy. I just want to be sure I'm sharing the right document with you.

A Yes. Thank you. The '202 patent is coming up on my screen now. Okay. The '202 patent is on my screen.

Q Great. And just for clarity since this patent bears the same Exhibit Number as the '825 patent, I will refer to this as the '202 patent from here on out. I think that will be easier for all of us.

A Yes. Thank you.

Q Could you please scroll to page 25 of the document? And would you look at claim seven?

A Okay. I have claim seven in front of me. Would you give me a moment to read it to refresh my memory?

Q Yes. Please do.

A Okay. Thank you. Okay. I've read claim seven.

Q Okay. So similar to the questions that I just asked, is it your view that claim seven covers using a control circuit to adjust a bias current for an amplifier?

MR. JOHANNINGMEIER: Same objections. You are literally killing our time with this. Please. Outside the scope. You are asking for a legal conclusion. I object to the form of the question.

MR. UHR: Again, counsel, that's a speaking objection. Are you instructing the witness not to answer?

MR. JOHANNINGMEIER: No. I'm not going to instruct him not to answer. I'm pleading with you to ask a decent question and do it on claim language

so we don't have to walk through five of these. You do whatever you want. It's your depo. Go right ahead.

MR. UHR: Thank you.

A Could you ask the question again? I just want to be sure I have it correct.

Q Yes. Of course.

Is it your view that claim seven of the '202 patent covers using a control circuit to adjust the bias current for an amplifier?

MR. JOHANNINGMEIER: Same objection.

A So claim seven, as before, it talks about a plurality of circuits, measurement of signal and interferer, and then based on that information the calculation is done, and then claim seven talks about changing a bias circuit of one or more of those circuits, could be an amplifier, could be a mixer in the signal path, and that calculation is done with something you call a control circuit.

Q And does the change --

A Yeah.

Q I'm sorry to cut you off. Please finish.

A I was going to say presumably, because the word control circuit is not mentioned in the claim. But some kind of circuit would have to do that determination.

Q Okay. And would a control circuit make the change in the bias current?

MR. JOHANNINGMEIER: Objection.

A You know, as before, the control, as you call it the control circuit is doing the calculation and causing it to be changed. Whether it changes it, I guess, you know, once again the distinction between causing it to be changed and changing it is not clear to me in the circuit like this or in any circuit.

Q Okay. I'm not looking to draw a distinction between changing and causing it to be changed. So generally when I ask the question it's, encompasses causing to be changed.

A Okay. Thank you. I appreciate your clarification on it.

Q Let me -- I know this is a little bit painstaking. Let me see if I can try and make it go

a little bit quicker. Claims eight through ten are dependent on claim seven. And I'm happy to let you read through those.

A Yes. I think claims eight and nine depend on seven and ten depends on nine.

Q Okay. Do you see anything in those claims that would exclude using a control circuit to adjust the bias current in an amplifier?

A Only possibly in claim eight, because claim eight talks about dynamically increasing the impedance in the circuits and that can be accomplished without any change in the bias, in the DC bias current. So claim eight would I would say not preclude a change in DC bias, but it may, it could be accomplished without a change in DC bias current.

Q Okay. Would you mind looking at claim eleven? We only have a few more of these to go through, I promise.

A Perfectly fine. No problem. Claim eleven. Let me just review it quickly and then -- okay. I've read claim eleven.

Q Okay. Do you see anything in claim eleven that excludes changing the bias current of an amplifier or a mixer using a control circuit?

A Yeah, I don't see anything in claim eleven that precludes the changing of a bias current with a control circuit.

Q Okay. Could I ask you to look at claim 13 and I'm going to ask you the same question for claim 13.

A Okay. Let me review claim 13.

Q Please do.

A Okay. I've read claim 13.

Q I'll read you the question again. Do you see anything in claim 13 that excludes changing the bias current of an amplifier or a mixer using a control circuit?

MR. JOHANNINGMEIER: Objection. Scope.

A I don't see anything in claim 13 that would preclude changing the bias current in an amplifier or a mixer with what you call a control circuit.

Q Okay. Last group of claims here. Could I

ask you to read over claims 19 through 21?

A Yes. Give me a moment. Okay. I've read 19 through 21.

Q Great. The same question here. Do you see anything in claims 19 through 21 that would exclude changing the bias current of an amplifier or a mixer using a control circuit?

MR. JOHANNINGMEIER: Objection.

A I see nothing in claims 19 through 21 that would preclude or exclude changing DC bias current of either an amplifier or a mixer by what you refer to as a control circuit.

Q Okay. Thank you for that. Let's go ahead and move on. I'm going to introduce a new exhibit here and I'm going to put this in as Exhibit 1016. This has not previously been submitted in either of the proceedings.

(Larson Exhibit Number 1016
was marked for identification.)

BY MR. UHR:

Q I just uploaded it. It should be available to you shortly I hope.

A Thank you. I'm looking for it. Is this Analog Integrated Circuit Design, 1245825.pdf?

Q Yes. That's correct.

A Okay. Clicking on it. The little wheel is spinning.

Q It's a large document. It may take a minute to come up.

A I'm sorry. It's still spinning. Don't worry. It's coming.

Q Okay.

A I just got this message that says file regeneration is still in progress. You can stay on this page and keep trying manually or exit link preview and return at a later time. So I'm going to hit the reload button, which is what I think they mean by -- I'm sorry.

Q No. It's not your fault. I would like to give it a chance to come up on your screen if we can, but if it ultimately doesn't work, I will figure out some other way to do this.

A Yeah. You might want to send a PDF file at some point or. Or actual link preview and return

at a later time. Let me just try again here. So the wheel is still spinning but it's just slow.

Q All right. In the interests of time --

A I'm so sorry.

Q No. It's not your fault at all. Just to keep us on track here, I'm going to go ahead and share my screen hopefully and let's see how that goes.

A Okay. And the little wheel is still spinning so if it does pop up, I will let you know and we can maybe revert to that.

Q Okay. How is that? Can you see my screen?

A I can see your screen, yes.

Q Okay. And is it big enough for you to read and see the text? I know this text is rather large on this page. It may be smaller on subsequent pages.

A Okay. Yeah. I can see the cover of the book, yes.

Q Okay. Do you recognize this document?

A I do. Yes. It's a very well-known

textbook on analog integrated circuit design, and just in the interest of full disclosure, Professor Martin was on my Ph.D. committee at UCLA and I know him very well.

Q Have you published any papers with Ken Martin?

A I may have published one or two papers as part of my Ph.D. dissertation with Ken, yes. I would have to review my CV, but I'm pretty sure that I have one or two co-authorships with him.

Q And do you have any other work experience with Ken Martin?

A When I was at Hughes Research Labs in the 1980s and early 1990s he consulted for us. And so I knew him, I also had a consulting relationship with him when I was at Hughes.

Q And do you recall the subjects matter of that consulting?

A Yes. It was on analog to digital converters.

Q Okay. And what would be the application for an analog digital converter?

A Well, you know, any time you have a, an analog signal, which might be, for example, you know, in this loss, in this case, the output, the final output of the transceiver is an analog signal and you would then want to convert it to digital so that it could be processed by a computer. That's one example.

Any kind of a sensor, analog sensor, pressure temperature, fluid flow, those signals typically have to be converted to digital form in order to further process them. So analog to digital converters have a very, very wide range of applications. Digitizing audio for speech processing, for example, another example.

Q Okay. And I understand from your CV that you have -- you've taught electrical engineering courses at the college level before; is that right?

A Yes. I have taught electrical engineering at the college level for many decades.

Q Have you ever taught using this particular textbook?

A I may have once in about 15 years ago when

I was a professor at UC San Diego.

Q But you can't recall exactly?

A I'm sorry. I cannot recall exactly.

Q Okay.

A This is a very good textbook. It is one of several excellent textbooks in this field. So I can't recall which one we were using for that course and that's why I hesitate to give you a definitive answer.

Q No problem. I'm going to scroll down here to the third page of the PDF and I'm not sure how this is showing up on your end, but can you see in about the middle of the page it says Copyright 1997?

A I see that, yes.

Q Okay. And is it your understanding that that date predates the date of both the patents at issue here?

A I believe that's correct, yes.

Q Okay. I'm going to scroll down here to page 42 of the textbook. And you let me know if this text appears too small on your screen.

A No. It's fine. I can see it quite well

actually. Thank you.

Q Excellent. So do you see here at the bottom of the page it says Bipolar Junction Transistors?

A Yes. I see that.

Q And now I'm going to stay in the same section here and scroll down a couple pages to page 44 and based on my scrolling, it appears we are in the same section, correct, 1.4 Bipolar Transistors?

A Yes. I believe we are still in the same section, Bipolar Transistors.

Q Okay. Do you see Figure 1.27A at the top of the page?

A I do. Yes. 1.27A, an npn transistor.

Q Okay. And Figure 1.27A shows a bipolar transistor having a base, a collector and an emitter; correct?

A Correct.

Q And do you see the notations IB, IC and IE there next to the arrows?

MR. JOHANNINGMEIER: I just want to lodge a scope objection.

A Yes. I see IB, IC and IE labeled in Figure 1.27A.

Q Okay. IB would be the base current?

A IB would be the base current.

Q Would IC be the collector current?

A IC would be the collector current.

Q And would IE be the emitter current?

A IE would be the emitter current.

Q I'm going to scroll down to page 46. And we are still in that same section, 1.4, Bipolar Transistors; right?

A Correct. We are still in the Bipolar Transistors section.

Q Okay. Do you see Figure 1.29 toward the top of the page?

A Yes. I do. Figure 1.29.

Q Okay. And then in the first line of text below that, the text says: "A typical plot of the collector current, IC, as a function of collector-to-emitter voltage, VCE, for different values of IB is shown in Figure 1.29 for a practical transistor."

Do you see that text?

MR. JOHANNINGMEIER: Objection. Scope.

A Yes. That's like the second sentence in that or the first full sentence in that page, "to illustrate this point", et cetera, et cetera.

Q Yes. That is correct.

A Yes. I see it. Yes.

Q And that sentence uses the notation IB. Is IB the base current there also?

A Yes. IB is the base current.

Q Okay. At the end of this section here there is a sentence that says: "This dependency results in a finite output impedance and can be modelled by modifying equation 1.27."

Do you see that?

MR. JOHANNINGMEIER: Objection. Scope.

A Yes. I see that. And I think they are referring to -- yes. I see that.

Q So a bipolar transistor has an output impedance. Would you agree?

MR. JOHANNINGMEIER: Objection. Scope.

A A bipolar transistors has an output

impedance, yes, it does.

And perhaps I should clarify, just to clarify what's in the text. By output impedance, the authors mean from collector to emitter. Because the collector is usually taken as the output of the transistor in this mode of operation.

Q Could you measure the output impedance of a bipolar transistor by calculating the ratio of the collector-to-emitter voltage to the collector current?

A If it is an AC measurement, then yes, that impedance would be the ratio of the collector/emitter, AC voltage to collector AC current.

Q Okay. In Figure 1.29 at the top of the page IC is plotted against the collector-to-emitter voltage along five curves. Do you see that?

A Yes. I see it in 1.29.

Q And would each of these curves correspond to a particular base current IB?

MR. JOHANNINGMEIER: Objection. Scope.

A Probably, yes. Each one of those curves

corresponds to a fixed IB current. And the reason I hesitate a bit is sometimes it says in the plot these are at fixed IB currents, but probably that's the intention of the authors in this case.

Oh. I'm sorry. Let me clarify this a bit. If you look at that first sentence there at the top it does say for different values of IB. So yes, each one of those curves corresponds to a unique value of IB.

Q So is your clarification that each curve corresponds to a steady value of IB?

A Steady or perhaps a fixed value of IB.

Q Okay.

A Correct.

Q And each of the curves in Figure 1.29 has a different slope; right?

A Yes. It looks like the slopes are slightly different for each one of those curves. The slope being, just again to be particularly precise, the change in the collector current over the change in the collector/emitter voltage.

Q Okay. And I think you said earlier, and

correct me if I'm repeating this back incorrectly, but I think you said that the output impedance could be measured by taking the ratio of the collector-to-emitter voltage to the collector current; right?

A Taking that ratio for AC signals of both the voltage and the current.

Q Assuming Figure 1.29 plots the voltage against the current, would the slope of each curve be indicative of the output impedance?

MR. JOHANNINGMEIER: Objection. Scope.

A So the slope of these curves, you used the word indicative, and it would be indicative of the real part of the impedance. It would not have any bearing on the imaginary part of the impedance and what we were calling the capacitive or inductive reactances earlier today.

Q Since each of these different curves is intended to correspond to a different value of the base current, IB, would you agree that the output impedance of a bipolar transistor varies as the base current varies?

MR. JOHANNINGMEIER: Objection. Scope.

A Well, let me be precise to answer your question. For a fixed base current and a -- I'm sorry. Could you repeat your question? I want to make sure I get it just right.

Q Sure. So each of these curves is intended to correspond to a different value of the base current; right?

A That's correct. Each is different base current.

Q Okay. And since each of these curves has as different slope, wouldn't the curves suggest that the output impedance of the bipolar transistor varies as the base current IB varies?

A I believe the answer to your question is correct. And the, just once again to be very precise, if you keep the collector/emitter voltage constant and you change the base current, you can expect the real part of the output impedance to change as you vary that base current.

MR. UHR: Okay. Counsel, we've been going for just about an hour. If you guys are ready to

take a break, I'm at a good place. Professor Larson, are you ready for a break?

THE WITNESS: A break is fine. Yeah. Yeah. I'm happy either way, but a break is always welcome.

MR. UHR: Ten minutes? Does that sound good.

THE WITNESS: Ten minutes is fine.

VIDEOGRAPHER: We are now off the record at 2:15 p.m.

(Recessed at 2:15 p.m.)

(Reconvened at 2:26 p.m.)

VIDEOGRAPHER: We are now back on the record at 2:26 p.m. You may proceed.

BY MR. UHR:

Q Okay. Dr. Larson, can I ask you to look back at Exhibit 1004, the Rauhala reference?

A Yes.

Q And would you mind turning to Figure 6 on the last page?

A Yes. I see it there. Figure 6 of page 10 of Exhibit 1004.

Q Correct. And you see the component labeled Q1; right?

A Q1 is a bipolar transistor at the bottom left of Figure 6.

Q And since it's a bipolar transistor, Q1 would have a base; right?

A Yes. Q1 will have a base.

Q Is the base of Q1 that horizontal line extending from Q1 over to Q2?

A Well, I guess what I would say is that there is a wire connecting the bases of Q1 and Q2. And that horizontal line represents the bases of Q1 and Q2 as well as the wire that connects it.

Q So a current flowing to the base of Q1 along that wire would be a base current; right?

MR. JOHANNINGMEIER: Objection. Scope.

A I mean a current flowing through that wire into the base of Q1 would be a base current, yes.

Q And that base current would change as KI changes; right?

A Yes. As KI changes, the base current going to Q1 will change as well.

Q So then would the output impedance of Q1 change as KI changes?

MR. JOHANNINGMEIER: Objection. Scope.

A So your question -- I'm sorry. Say your question one more time please.

Q Would the output impedance of Q1 change as KI changes?

A I believe the answer -- yes. As KI changes, the output impedance of Q1 will change as well. And let me also be very precise. By the output impedance of Q1, I mean the ratio of the voltage at the collector and base of that transistor to the collector current and base current. Collector plus base current.

Q Okay. And we talked about this a bit earlier. Do you see in the right-hand corner the box labeled 61 and it says "diff. amp" in it; right?

A Yes. I see box 61.

Q And diff. amp here means differential amplifier; right?

A I believe that's correct, yes. Differential amplifier.

Q I would ask you to go to paragraph 21 of this document.

A Okay. I see paragraph 21. It says, "Figure 6 shows an example of," et cetera.

Q Okay. And do you see in the second sentence where it says: "In this example the linear unit 61 is an amplifier realized by a differential pair"?

A I see that sentence, yes.

Q Okay. And toward the middle of this paragraph there is a sentence that says: "The collector of transistor Q2 is coupled to amplifier 61 so that the total current I of the transistors in the amplifier is brought to the collector."

Do you see that?

A I'm sorry. I'm trying to find it. There is a lot of Q1s and Q2s in this paragraph.

Q Please take your time.

A What does the sentence begin with?

Q It begins, "the collector of transistor Q2".

A Is coupled to amplifier 61?

Q Yes.
A Yes. I see that sentence.
Q And that sentence refers to transistors in the amplifier; right?
A So I'm -- if you don't mind, I'm going to refer to my paper copy as well, because there is a figure and text and I want to be able to see both of them simultaneously. So...
Q Sure.
A I just want to let you know I'm going to partial paper.
Q Take your time.
A Okay. I see Figure 6 and I see that sentence and I see how they are related to each other.
Q Okay. So based on those two sentences that we just read, would you agree that the differential amplifier 61 includes a differential pair that incorporates transistors?
MR. JOHANNINGMEIER: Objection. Scope.
A Could you repeat your question?
Q Based on those two sentences in paragraph

21 that we just looked at, would you agree that the differential amplifier 61 includes a differential pair that incorporates transistors?

A Yes. Differential amplifier 61 incorporates transistors, yes.

Q And would the transistors of linear unit or differential amplifier 61 have impedances?

MR. JOHANNINGMEIER: Objection.

A If your question is do the transistors in differential amplifier 61 include impedances? Yes, they would have, they would have impedances.

Q And looking back at Figure 6, there is a supply current that's labeled with the letter I coming out of differential amplifier 61; right?

A Yes. That current I is leading into the collector of the transistor labeled Q2.

Q If that current I changes, would the impedances of the transistors in the differential amplifier 61 change?

MR. JOHANNINGMEIER: Objection. Scope. Speculation. Form.

A So could you ask me the question one more

time? Sorry.

Q Let me break it into pieces. So do we agree that supply current I is changed over time according to the teachings of this document?

A Yes. The supply current I will change depending on the status of switches Ka and Kb as shown in this figure.

Q And as supply current I changes, would the impedances of the transistors in the differential amplifier also change?

MR. JOHANNINGMEIER: Objection. Scope. Speculation.

A Yeah. As the supply current I to the differential amplifier changes, that will change the DC bias current through the transistors and that will change their impedances.

Q Okay. Can we switch over to the '202 patent?

A I have it here in front of me on the screen.

Q Okay. Could you please go to column 8, line 25?

A Okay. I'm there.

Q Okay. The specification here is describing a block diagram shown in Figure 8A. Do you see that?

A I do. That's the first sentence of that line 25. And I'm sorry. I'm pulling up the paper copy as well so I can refer both to the text and to the figure.

Q Yeah. That's perfectly fine.

A Yes. I see the figure and I see the text.

Q And do you agree that Figure 8A in each shows a block diagram?

A Yes. Figure 8A shows a block diagram.

Q Okay. Pointing you back to the text here, at line 27 of column 8 there is a sentence that says: "Functional block 820, like the functional blocks in the following diagrams, may be a filter, mixer, amplifier or other circuit or circuits in a wireless transceiver or other electronic circuits or system."

Do you see that sentence?

A Yes, I do.

Q Would you agree then that functional block 820 could include multiple circuits?

A Functional block 820 could certainly contain multiple circuits.

Q Okay. I'm going to switch gears here a little bit and introduce a new exhibit. I'm going to mark this Exhibit 1017.

(Larson Exhibit Number 1017 was marked for identification.)

BY MR. UHR:

Q And if you bear with me a minute, go ahead and put that in.

A I do not see it yet.

Q Okay. I have just hit the upload button and let's give it a minute. This is another fairly large file, so we may run into the same problem. Let's give it a minute. And if it doesn't show up, we can share our screen again.

A Okay. Yes. This is -- it just came up on my screen and I will try to click on it and bring it up. Once again spinning wheel. I'm sorry it's taking so long again.

Q Not your fault at all.

A So I just got the same error message as I got before. It's kind of suggesting that I try return at a later time.

Q Okay. Let's do what we did last time. Let's share our screen.

A Okay.

MR. UHR: Sangwoo, would you mind bringing up Exhibit 1017?

THE WITNESS: I'm honored that you would use my book.

BY MR. UHR:

Q I take it you recognize this document?

A Yes. I recognize this document.

Q And what is this document?

A The title of the book is RF and Microwave Circuit Design for Wireless Communications, published by Artech House. I was the editor of this book.

Q And do you recall when this text was published?

A I'm a little unclear on the exact date. I

would guess 1994, but you may have more accurate information.

Q But it would be before -- this book would predate the two patents at issue; correct?

A Yes. I believe that's correct.

Q And you are listed as an editor on the cover. What exactly does that mean?

A Well, I collected and commissioned a set of authors to write various chapters of this book. And then I -- around this consistent theme of the title of the book, and then I edited their contributions and worked with the publisher to get the final manuscript published.

Q So you would have had the power to correct anything put forth by those authors that you disagreed with; is that right?

A Well, I think perhaps the power to correct -- I suppose that's true in theory. In practice if an author and I disagreed about something, we would talk about it together and come up with some mutually agreeable compromise.

Q So you don't recall anything in this

textbook that you disagreed with; is that right?

A I do not recall anything that I disagreed with.

Q Okay. And while you edited this text, were you employed?

A Yes. I was employed at Hughes Research Labs at the time.

Q And was editing this textbook related to your role at Hughes?

A It was related in the sense that I was working at the time on many of the issues that were discussed in the book.

Q What was your job at Hughes during the time you edited this book?

A Well, you know, I think -- I don't remember the exact title that I had at that time. It's in my CV. I was I think department head or section head of a section within the research labs and I can't remember the title of the section, but I was a technical manager at the time.

Q What was the intended audience for this textbook?

A The intended audience was engineers who were working in the field of wireless communications of all different types, both commercial and military, mobile and fixed.

Q And do you recall that you provided an opinion as to the level of skill a person of ordinary skill in the art would have in your declaration?

A Yes. I recall that.

Q Would you say that a person of ordinary skill in the art would be able to understand the concepts in this textbook?

A Yes. Based on my definition of a person of ordinary skill in the art, I think they would be able to understand the concepts in this book or perhaps learn new concepts from the book.

Q Okay. I'm going to ask that we scroll to page 51 of the textbook. Dr. Larson, please let us know if the text is too small for you to read.

A It's a little small. That's fine. I can read that. And to me from the art it looks like perhaps this is Chapter 3, Professor Abidi's

chapter.

Q And would you have reviewed this chapter?

A Yes. I would have reviewed this chapter.

Q So if not now, at least at one point you were familiar with the material in this chapter; correct?

A Yes. That's correct.

Q Do you see in the bottom right-hand corner there is a heading 3.3, ICs in Broadcast Radio Receivers?

A Yes. I see that, Section 3.3.

Q What are ICs?

A IC is short for integrated circuits.

Q And what is an integrated circuit?

A Well, an integrated circuit is a collection of transistors and other elements that performs a complicated function and the particular characteristic of it is that all of those functions and all of those elements are integrated onto a single small piece of usually silicon.

Q The heading also refers to broadcast radio receivers. What are broadcast radio receivers?

A Well, broadcast radio receivers is a wide range of different types of functions from pagers to FM radio, AM radio. Those are the most common. Emergency Broadcast System maybe also would be an example. It's a wide range of services that are cast across a wide range, hence the term broadcast.

Q Are there any other -- strike that.

A Yeah. You know, I -- you know, it might help me if you would go to the next page. You know, this term broadcast radio has kind of evolved over the years and this is from 30 years ago.

So at that time we might have even been considering mobile wireless like cell phones, analog cell phones in those days as an example. But I'm not quite sure. I just don't honestly remember what Professor Abidi meant, if anything, more broadly than what I have described.

Q And would a broadcast radio receiver receive an RF signal?

A Yeah, a broadcast radio receiver would receive an RF signal. You know, there is some uncertainty about the lower frequency limit for,

quote/unquote, RF and does AM constitute RF, but generally speaking yes, an RF radio receiver would receive a broadcast transmission.

Q Okay. Could we scroll to page 52? We are going to be staying in the same section here. And is that big enough that you can see the text on the left side of the page, Dr. Larson?

A I can, yes.

Q Okay. Now, in the bottom paragraph on page 52, about two-thirds into the paragraph, there is a sentence that says: "Kasperkovitz solved the problem with an architectural innovation, by dramatically lowering the IF from 10.7 megahertz to 70 kilohertz."

And feel free to read the text surrounding that to give yourself some context.

A Okay. I think I remember this, yeah, this innovation. I believe I remember it from back in the day. So I'm -- okay.

Q Does IF in that sentence mean intermediate frequency?

MR. JOHANNINGMEIER: Objection. Form. I

make an objection to this line as being way outside the scope. Of course you can answer the question.

A Yeah. I believe IF stands for intermediate frequency.

Q What is an intermediate frequency?

A Well, you know, we spoke earlier in the day about taking high frequency signals and translating them down to lower frequency signals for consumption by humans or computers or whatever, and for a variety of reasons that conversion is often done in two steps.

And the second step -- so let me back up. The first step converts that high frequency signal down to an intermediate frequency or IF. And then the second down conversion step would convert that to the final frequency. So that's the origin of the term IF.

Q Okay. And this particular portion that we just read from the text says Kasperkovitz solved the problem. Do you recall here what the problem was that he solved?

MR. JOHANNINGMEIER: Objection. Scope.

A I think I remember the problem. And this in particular is referring to FM radio receivers and so the use of this IF frequency is problematic from a cost and form factor perspective. And you know, you need a second down conversion mixer, you need a filter that is centered at ten megahertz, and so there was an unmet need to dispense with this 10.7 megahertz IF and convert the -- and there was no easy way to built an integrated circuit that would replace the filtering necessary for that 10.7 megahertz IF.

So there was an unmet need for a single down conversion or a down conversion to a much, much lower frequency, and so I believe that this particular innovation dispensed with the 10.7 megahertz and took it all the way down to 70 kilohertz, and at 70 kilohertz that's very easy to realize on an integrated circuit forum. And so it allowed really for the first time like a single chip FM radio receiver, which 30 years ago was a major innovation. So the, that's my memory of the kind of history of this particular innovation.

Q Okay. Sticking with the, if we move over to the top of page 53, can you see that okay?

A I can. Let me minimize the -- okay. I can see it fine. Yes.

Q And then the first sentence says: At a 70 kilohertz IF, or intermediate frequency, the image frequency lies halfway to the adjacent FM channel. Do you see that?

A Yes, I do.

Q Now, what is the image frequency there?

MR. JOHANNINGMEIER: Objection. Scope.

A Well, you know, when you are down-converting a signal using a mixer, down-converting means taking the frequency down, the resulting frequency is that the difference between the frequency of the signal that you are trying to down-convert and the frequency of the local oscillator.

So, for example, if you want to down-convert a 90 megahertz FM signal to 10.7 megahertz, the local oscillator would be at roughly 80 megahertz. And the problem is that there is

another frequency which also has a difference of 10 megahertz and that's a signal frequency of 70 megahertz.

So that other frequency of 70 megahertz that you do not want to down-convert to 10.7 megahertz is the image. So the image is an unwanted, it's a signal that's out there and it's unwanted and you do not want to down-convert that to your desired signal. And in the FM cases that would correspond to roughly ten megahertz.

Q So the image frequency is not a desired input to the radio receiver; correct?

A I would have to say in general you are correct. I mean there are cases where you would want -- you wouldn't want to down-convert that other signal and then the image becomes the desired signal. But for a particular channel that you want to down-convert at that particular moment, the image is something, yes, that you would not want to down-convert.

Q And that would be the case in this section of your textbook, right, that the image frequency is

not a signal that you want to down-convert?

A That's correct. In this particular context an image is something you would not want to down-convert to the desired frequency.

Q Okay. Staying on the same paragraph, the third sentence says: "As an RF preselect filter cannot possibly reject an image this close to the desired signal, it will pass unattenuated to worsen the received signal-to-noise ratio (SNR) by three decibels."

Do you see that?

A I do. Yes.

Q Okay. And that sentence uses the term image. Is that the same as the image frequency?

MR. JOHANNINGMEIER: Objection. Scope.

A Yeah, I believe that that means that they are referring to -- in other words, as -- I'm just reading that sentence. RF preselect filter cannot possibly reject an image this close to the desired signal. And I believe that image in that sentence is what we have been referring to.

Now, let me -- let's be a little bit

careful, because an image can mean many different types of things. So for this 70 kilohertz IF architecture the image that we are talking about is not a signal, it's the noise, and that sentence states this, in this interchannel band.

So that's why the signal in this particular case, the signal-to-noise ratio is increased, or sorry, reduced by 3 dB. In other words, the image in this case, it's not an adjacent channel in FM, it is the noise that exists in between the channels. And that noise floor is then raised at the output by the down-conversion of that interchannel noise and the degree that it is raised is 3 dB just as that chapter states.

Q So here would it be the case that the signal and the noise are received together?

A If I could have a clarifying questioning? Which signal and which noise are you talking about?

Q Well, I believe that you referred to the image frequency as noise in your past answer. Is that, is that a correct restatement?

A Yes. So there is noise in the, at the

image frequency and it's called interchannel noise in the text. So yes, that's received at the same time as the signal and it's also received at the same time as the noise in the signal band.

Q And that noise is undesired input; correct?

MR. JOHANNINGMEIER: Objection.

A The noise is undesired input, yes.

Q And toward the end of that sentence it refers to signal-to-noise ratio. Is the signal-to-noise ratio referred to there, is that a ratio of the desired signal to undesired input?

MR. JOHANNINGMEIER: Objection.

A Well, it's, it's the ratio of the desired signal to the noise in the receive band of the receiver, and it could be inputs, it could also be noise that's intrinsic to the circuit. So the noise is just the noise and its source is -- well, its source would be complicated.

Q Can you explain why the source would be complicated?

A Yeah. So all I really mean by that is

that noise in these circuits, in these signal chains comes from the external world, which is received by the antenna, and then it comes from internal circuit noise that's generated internally in the system.

And the noise that finally appears at the output at the very end of all of that chain is a combination of those two sources; the source from the external world and the source from the circuits themselves. And we just talked about imaging noise. You know, an image noise factors into all of that stuff that accumulates at the output.

Q Within the undesired inputs that are used to calculate that signal-to-noise ratio, that would include the image frequency; right?

MR. JOHANNINGMEIER: Objection.

A It would include the noise in this embodiment. It would include the noise that is at the image frequency.

Q Could you clarify what you mean by noise at the image frequency?

A Yes. In fact, it's the second sentence in that paragraph. It says: "The image therefore is

the interchannel noise in the FM band." And what is meant by that is that there is -- in between two FM stations there's, ideally there would be nothing, nothing at all. But in reality there is noise that gets filled in, you know, once again from potentially external sources as well as internal circuit noise sources.

And so those two things add together to create interchannel noise in the FM band. It's that space in between two FM signals where there should be nothing ideally, but in fact there is noise.

Q And the same sentence that we've been looking at, it says that it would worsen the SNR by 3 dB. DB stands for decibel there; right?

A Yes. DB stands for decibel.

Q And a decibel is a unit of measurement; right?

A Yes. A decibel is a unit of measure and 3 dB is equivalent to a factor of two.

Q Now, is it correct that a decibel expresses a ratio of two values on a logarithmic scale?

A Yes. A decibel is a logarithmic measurement, and if it's dB and only dB, then it is a ratio and a logarithmic measure of a ratio.

Q Okay. I would like to switch exhibits here. Sang, I think you can stop sharing your screen. Dr. Larson, could I ask you to turn to your declaration, Exhibit 2015?

A Yes. Okay. I have it here in front of me.

Q And would you mind going to paragraph 73?

A Yes. Okay. I'm at paragraph 73.

Q Okay. In the first sentence you wrote: "Rauhala does not disclose any detection of signal strength beyond the indication that a threshold has been crossed." Actually, I --

A Do you mean paragraph 75?

Q That's my fault. I pointed you to the wrong paragraph. I do want to start at paragraph 73. I'm sorry for jumping ahead though.

A That's fine.

Q He writes: "Lenovo and Professor Baker point to mention in Rauhala of a signal-to-noise

ratio as supposedly disclosing the comparing the signal strength of the desired signal and the signal strength of the interferer signal, as claimed in the '202 patent."

You see that, right?

A I do see that, yes.

Q Okay. And now if we move down to paragraph 75, I think this was what I was trying to read in the first place. "Rauhala does not disclose any detection of signal strength beyond the indication that a threshold has been crossed."

Do you see where you wrote that?

A I do. Yes.

Q And then in just the next sentence it says: "A mere indication of a threshold crossing is not suitable for directly comparing two numbers."

Do you see that?

A I see that, yes.

Q So is it your view that a person of ordinary skill in the art would understand the comparing element in the claims of the '202 patent to require directly comparing a desired signal

strength value to an interferer's signal strength value?

MR. JOHANNINGMEIER: Objection.

A Yeah, well, my belief is, and I might want to review the exact wording, but my belief is that the '202 patent claims talk about, you know, measuring -- let me maybe pull up the, just make sure I have the exact wording correct. Measuring --

I'm looking now, for example, at claim seven. Determining signal strength of the desired signal, determining signal strength through the interfering signal, comparing the desired strength relative to the strength of the interferer. Sorry.

So, yeah, the '202 talks about comparing the strength of the desired signal relative to the strength of the interferer.

Q And does that claim that you just read, claim 7, does that use the word "directly"?

MR. JOHANNINGMEIER: Objection.

A Let me just check. Yes, I don't see the word "directly" in claim seven.

Q Okay. And just going back to your

declaration one more time, in paragraph 75 you say: "A mere indication of a threshold crossing is not suitable for directly comparing two numbers."

So what I would like to know is what is your basis for understanding that the claims require directly comparing?

MR. JOHANNINGMEIER: Objection.

A Well, you know, I would say that the claims in the '202 patent, for example, talk about measuring a signal strength of a desired signal, measuring the signal strength of an interferer, and that's used to, you know, change various impedances and bias currents and other aspects of the receiver, and a threshold measurement by itself would not be sufficient to optimize the performance of the receiver.

Q Could you please turn back to the '202 patent and look at claim seven one more time?

A Yeah.

Q Now, I believe you just said that the '202 patent, for example, talks about measuring a signal strength of a desired signal?

A Uh-huh.
Q Do you see the word "measuring" in claim seven?
MR. JOHANNINGMEIER: Object.
A I do not see -- let me check. I do not see the word "measure" in claim seven.
Q So what is the basis for your opinion that claim seven requires measuring the strength of the desired signal?
MR. JOHANNINGMEIER: Objection. He stated no such opinion. Misstates testimony.
A Well, you know, I was just reading the plain claim language here. Determining the strength of the desired signal. That determination has to be done somehow and a measurement would be the way to determine that signal. Sorry. Determine the strength of that signal.
Q Okay. I would like to look at the specification of the '202 patent. In particular could you please turn to column six and line 52?
A Okay. I'm going to use the paper version.
Q That's fine.

A Line 52 begins with, "Figure 4 illustrates a portion," et cetera.

Q Yes. The whole sentence says: "Figure 4 illustrates a portion of a receiver consistent with an embodiment of the present invention."

Do you see that sentence?

A I see that sentence, yes.

Q And then a bit lower down in the paragraph it says: "Signal strength indicator circuits 440 and 450 are connected to input line 410 and output line 460."

Do you see that?

A Yes. I see it.

Q And then moving on a couple of sentences more, it says: "The signal strength indicators 440 and 450 do not provide information as to the relative sizes of the desired and interfering signals, rather a cumulative signal level is provided at their outputs."

Do you see that?

A I do. Yes.

Q What is your understanding of what signal

strength indicator 440 is determining in Figure 4?

MR. JOHANNINGMEIER: Objection. Scope.

A So let me just -- I'm just going to look at Figure 4 very quickly.

Q Please do.

A Figure 4 shows, you know, block 440 labeled SSI1 and block 450 labeled SSI2, and I believe I presume that SSI stands for signal strength indicator.

So there is a signal strength indicator at the front of this block, which is 440, and there is a signal strength indicator at the back, which is 450. And I guess each one of them measures the total signal strength at that, those points in the circuit, at the input and the output of the circuit.

Q Is either one of those signal strength indicators 440 or 450 measuring a strength of only a desired signal?

MR. JOHANNINGMEIER: Objection.

A Yeah, as the sentence that we were talking about stated, I think it says it's the cumulative signal. That's the word. And so I believe that

those signal strength indicators are measuring the cumulative signals at that point.

Q So would your understanding be that the cumulative signal includes both the desired signal and the undesired signal?

MR. JOHANNINGMEIER: Objection.

A Yeah. And I think that this -- I think it's said nicely in the patent, that the -- it does not provide information as to the relative sizes of the desired and interfering signals, rather a cumulative. So there is no distinction between desired and undesired signals in that case, and for those two signal strength indicators.

Q And is it your understanding that the signal levels measured by 440 and 450 would be compared to each other?

A Well, I think that they would be compared to each other and also evaluated separately. Under like normal operation you would look at the comparison and you would also look at their individual values under kind of normal operation of the receiver.

Q What do you mean by look at their individual values? Could you explain that?

MR. JOHANNINGMEIER: Objection. Scope.

A Yeah. Well, the invention talks about varying various bias currents and impedances, you know, in response to signal conditions, and the ratio of these two will tell you something about, and this is actually discussed in the patent, but, you know, the ratio of these two will tell you a little something about where the interferers are and where the desired signal is, and the individual values will tell you a little bit about the signal levels in particular at that point in the signal chain, and all of that information can be used to adjust the circuit appropriately, both in bias and impedance and perhaps other measures as well.

So everything is important. Impedance -- maybe all of the information from both of these two detectors is important.

Q So is there any direct comparison of desired signals to interferer signals that's happening in Figure 4?

A Well, let me review the discussion a little bit, because I thought that this was discussed perhaps on -- let me just review.

So, you know, if you go to the discussion of this circuit, they talk about like in this particular case, you know, in this specific example they use the gain of the gain and filter circuit combinations as shown as approximately one while the interfering signals 414 and 416 are reduced.

So, you know, I guess all I'm saying really is that these blocks do treat -- sorry -- can treat interferers and desired signals differently and the signal strength indicators would be -- could be a measure of that, treating desired signals and interferers differently. I'm just reading the language of the patent here.

Q What is your basis for saying that those signal strength indicators could, could treat desired signals and interferer signals differently?

A Well, if we look at Figure 4 -- I'm sorry. I believe it's 4. Well, Figure 4 I think shows it rather nicely actually. And once again I'm just

looking at the patent here.

There is an element 420 is gain, element 430 is a filter, and once again 440 and 450 are the signal strength indicators, and you can see in this particular case I think they said that the desired signal was 412 and the interferers were 414 and 416 at the input, and then at the output you notice that those two little signals on the right are dramatically reduced compared to the most left signal, which is 462.

So like in this case, this is just from the patent really, the filter is treating the interferers a little differently from the desired signal and you would see this at the outputs of SSI1 and SSI2. I'm really just describing what's in the patent here.

Q Is it your understanding that 412, 414 and 416 are measurements taken by either of the signal strength indicators 440 or 450?

MR. JOHANNINGMEIER: Objection.

A Well, I think what I would say is that 440 measures 412 -- in this example it measures the sum

of 412 through 414 and 416 and 450 measures the sum of 462, 464 and 466.

Q So no components in this diagram measures the desired signal on its own; correct?

MR. JOHANNINGMEIER: Objection. Scope.

A Yeah. So in this diagram Figure 4, and if we are assuming that 412 is the desired signal of the input and 462 is the desired signal at the output, then nothing is measuring those two things by themselves.

Q Okay.

MR. UHR: We have been going for about an hour I think. Does this feel like a good time to take another break?

MR. JOHANNINGMEIER: Yeah. Counsel, can I just ask do you have a lot left?

MR. UHR: Not too much. I think we should be able to get through it before having to take another break so maybe this will be the last break.

MR. JOHANNINGMEIER: Hopefully. Yes. A ten-minute break is fine.

MR. UHR: Okay.

VIDEOGRAPHER: We are now off the record at 3:33 p.m.

(Recessed at 3:33 p.m.)

(Reconvened at 3:46 p.m.)

VIDEOGRAPHER: We are now back on the record at 3:46 p.m. You may proceed.

BY MR. UHR:

Q Dr. Larson, do you still have the '202 patent handy?

A Yes. I have it right here.

Q And I would like to direct you to column eight, line 25.

A Yes. I have it here. Column eight, line 25.

Q The specification here is describing a block diagram shown in Figure 8A. Do you see that?

A Yeah, let me turn to that figure. Yes. I see Figure 8A.

Q Okay. And then back to column eight, I'll point you to line 30.

A I see it.

Q It says: "An input signal is received on

line 812 by the optional gain element 814."

Do you see that?

A Yes. I see it.

Q Okay. And down just a little bit farther at line 35 there is a sentence that says: "The functional block receives an output signal from the optional gain element 810 and provides an output VOUT on line 822."

Do you see that?

A Yes, I do.

Q So what is your understanding of what's shown in Figure 8A?

MR. JOHANNINGMEIER: Objection. Scope.

A Well, to me it looks like a block diagram of a, you know, a function that has some optional gain, which is element 810, and then a function block that, you know, passes the input to the output. That function block I believe it says in the specification could be an amplifier or a mixer or a filter.

And then the impedance and DC bias controls change characteristics of that function

block. That's what I think it shows.

Q Okay. Could I ask you to skip down to Column nine, line one?

A Yes.

Q And the first sentence there says: "That the input spectrum is as shown in Figure 8B can be determined, for example, by low signal strength indications on line VIN 812 and VOUT 822."

Do you see that?

A Yes. I see that. I'm sorry. I'm just looking at the figure to kind of confirm that. I see it.

Q Okay. So does Figure 8B show an input signal spectrum?

A I believe so. I think by input signal spectrum they mean like these three things, the desired and the interferers 836, 837 and 838. I think that's what they mean by the spectrum in that case.

Q So 836 represents a desired signal; right?

A Yeah. 836 is labeled desired. Yes.

Q And 837 and 838 represent interferer

signals; right?

A Yes. They are both labeled interferer.

Q And how is the desired signal 836 measured here?

MR. JOHANNINGMEIER: Objection.

A Well, I think the measurement that they are referring to is not shown here. You know, I'm just reading once again the text and it says that the input spectrum can be determined, for example, by low signal strength indicators on line 812 and 822. And if you refer back to, what was that Figure 4, they give, Figure 4 gives an example of how you would actually determine those signal strength indicators on line 812 and 822.

Q Is there any description in the '202 patent of a device that measures only the desired signal 836 on VIN 812?

MR. JOHANNINGMEIER: Objection. Scope.

A Yeah. I mean there is nothing in the patent that talks about a specific device that measures the signal strength on 812 or 822. I believe it's inferred from the discussion of Figure

4, for example.

Q And as we discussed with respect to Figure 4, there was no component in Figure 4 that measures only the strength of the desired signal; right?

MR. JOHANNINGMEIER: Objection. Scope.

A Yeah, like in Figure 4, as we discussed before, you know, there is, the signal strength indicators in Figure 4 are measuring the total signals on those lines.

Q So with respect to Figure 8A or Figure 8B, does the '202 patent describe any direct comparison of a desired signal strength to an interferer signal strength?

MR. JOHANNINGMEIER: Objection. Scope. Also calls for a conclusion.

A In the specification for 8 I guess figure 8, 8A, 8B and 8C there is no talk of comparing a desired signal to an interferer.

Q Okay. I would like to point you to column eleven, line 46, still in the '202 patent.

A I found the column. Let me look at the figure now. Okay. I see Figure 14 and you said

column eleven, 46?

Q That's correct.

A Okay. I'm there.

Q Okay. And just for the record, since you are one step ahead of me, that portion of the specification is describing a block diagram shown in Figure 14; right?

A I believe that's correct, yeah. It's a block diagram of a receiver.

Q Okay. And if you look at line 50 in that same paragraph, it says: "Signal strength detection is done at the output of the low-noise amplifier by a signal strength indicator 1470, at the output of the mixer by signal strength indicator 1472, and at the output of the filter by signal strength indicator 1474."

Do you see that sentence?

A Yes, I do.

Q And is there any indication in this paragraph that signal strength indicator 1470 is measuring only the strength of the desired signal?

A There is no indication in this paragraph

that 1470 is only measuring the desired signal. It simply says signal strength detection is done.

Q And how about signal strength indicator 1472; same question?

MR. JOHANNINGMEIER: Objection. Scope.

A Yeah. The -- once again this is all one sentence, so signal strength detection is done at the output of the mixer by 1472 as well.

Q So 1472 is not measuring only the strength of a desired signal; correct?

A Well --

MR. JOHANNINGMEIER: Objection. Scope.

A Yeah, it depends. It depends a little bit on the contents of the signal at that point, but it doesn't necessarily have to measure only the desired signal.

Q Could you explain a little bit what you mean by it depends a little bit on the contents of the signal?

A Yeah. In the cases, this is talked about in the patent, like in a case where the interferer signals are very low and the desired signal is very

high, this signal strength indicator would be measuring the desired signal mostly, and as well as, you know, other noise components and other things that are there.

Q So the signal strength indicators would be measuring interferer signal strength in addition to desired signal strength even when the interferer signal strengths are very small; right?

A Yes. They measure whatever, the signal strength indicators measure whatever signals are present at their input.

Q Okay. Sticking with the example that's shown in Figure 14 and described in the specification in column eleven where I pointed you to, is a strength of a desired signal being compared to a strength of an interferer signal?

A I'm sorry. I don't understand the question. Do you mean in Figure 14? Or in -- can you be more, perhaps clarify that for me?

Q Yes. I'm referring to Figure 14. Is there anything in Figure 14 or the corresponding portion of the specification that suggests that

there is a direct comparison between desired signal strength and interferer signal strength?

MR. JOHANNINGMEIER: Objection.

A Well, if you look at Figure 14, it shows signal strength being measured at several points in the signal chain. And by the time the signal, the final signal is in front of the element 1450 which is labeled gain and ACC, presumably that is mostly the desired signal. Otherwise the receiver would be kind of nonfunctional.

So my presumption here is that the signal strength that's being measure at 1474 is largely the desired signal and you don't know 1470 and 1472 that it will be a combination of them all, but you could certainly compare, and of course the specification doesn't say compare, sorry, these paragraphs don't say compare, but, you know, 1474 is a measure of the, close to the desired signal and these other circuits measure something different, more cumulative signals I guess.

And, you know, so the cumulative thing, the cumulative measurements that are done here by

these three different signal strength indicators kind of give you both the desired signal as well as the, desired signal plus interference at various places along the chain.

Q But to be clear, there is nothing here that suggests a direct comparison of a desired signal strength with an interferer signal strength; right?

MR. JOHANNINGMEIER: Asked and answered.

A Well, I don't -- you know, all I can I guess say is that the, you said that there is nothing here that suggests. I mean the, the circuits can clearly do this comparison or do these measurements, so I presume that they are there for a reason. The reason in my belief would be to measure the desired signal and measure the other signals in the chain, which will be both interferers and the desired signal. So I guess the schematic itself makes that suggestion. I'm sorry. The figure itself makes that suggestion.

Q And are you aware of any other portion of the '202 patent that describes directly comparing

the signal strength of the desired signal to the signal strength of an interferer signal?

MR. JOHANNINGMEIER: Objection. Scope.

A Well, I would have to read over the '202 patent in some specificity, but nothing leaps to my mind at this point in time. I'm sorry. I have a dog.

Q I have a small dog too. Luckily he has been behaving so far.

A Mine has been great until this moment. Sorry.

Q Can I ask you to pick up the '825 patent one more time?

A Yes. Okay. I have it right here.

Q And could you turn to the very last page, please?

A Yeah. That's like page 26.

Q That's right. And in the right-hand column you see claim eight there, right?

A Yes. I see claim eight.

Q And claim eight is one of the claims that you considered when forming your opinions in this

case?

A I would have to go back and look at my declaration, but I believe that's the case, yes.

Q Would you mind looking at your declaration and just confirming?

A Yeah. So that's Exhibit 2015?

Q Yeah.

A Let's see. You know, I can't find it in here right off the top, but I'll assume that that's correct. That's perfectly fine.

Q Okay. If you look at line 40, thereabouts, actually it's just below line 40 because 40 is between two lines of text in claim eight. But do you see that there is a line that begins "causing" colon?

A Yes. I see that.

Q Okay. And it continues: "Causing", Roman numeral one, "the bias current of the one or more of the plurality of circuits in the receiver signal path of the wireless transceiver to be decreased."

A I see that. Yes.

Q What would a person of ordinary skill in

the art understand is required by that element?

MR. JOHANNINGMEIER: Okay. Outside the scope. The reason he couldn't find it in his clarification is because this kind of claim analysis isn't in the scope. You can answer the question, but calls for a legal conclusion. We object.

A Yeah. I'll answer the question. And I'm sorry. Could you give me the question again?

Q Sure. So I'm not going to reread that portion of the claim, but I'm referring to Roman numeral I under "causing" and I would like to know what your view is as to how a person of ordinary skill in the art would understand what is required by that element?

MR. JOHANNINGMEIER: Objection.

A By, you mean by the element that causes the bias current to be decreased, circuit element?

Q I'm sorry. I'll clarify. What I mean by element is that clause of the claim. So Roman Numeral I, what is required by that?

MR. JOHANNINGMEIER: Objection. Outside the scope. Calls for a legal conclusion.

A Well, you know, I would guess what's required for that bias current to be decreased as they say would be the conditions. I'm trying to answer your question as best as I can.

The conditions would be described earlier in that claim, you know. You receive a signal, you know, worst case power dissipation, you know, the power dissipation, reduction is accomplished by a bias current and the signal strength of the interferer is high and the signal strength of the desired signal is low and then that causes some changes to the bias and impedance.

And so all of those conditions would cause the bias current to be decreased, which is Roman Numeral I. So I'm trying to answer your question. I hope I'm being responsive.

Q I understand. What is a bias current?

MR. JOHANNINGMEIER: Objection. Scope.

A So a bias current is a DC bias that's applied to a circuit that, you know, provides it with energy that then, and that energy is then used for some function.

Q Okay. And then moving down to about line 47, it's the very last clause of claim eight. It says: "Thereby causing a drive current of the one or more of the plurality of circuits to be decreased."

Do you see that?

A Yes. That's like the final sentence of the patent.

Q What is a drive current?

MR. JOHANNINGMEIER: Okay. Objection. You know as well as I do that drive current is a claim construction issue in another case. I don't think it's appropriate to be asking him on the fly to interpret --

MR. UHR: Counsel, you can make your objection. I'm going to ask you not to make speaking objections.

MR. JOHANNINGMEIER: It's not a speaking objection. I'm telling you what's wrong with this question.

MR. UHR: Counsel, counsel, you are coaching the witness.

MR. JOHANNINGMEIER: I'm not coaching.

MR. UHR: Make appropriate objections. We let you speak. Let me finish. These are inappropriate. You are coaching the witness and if you have one more speaking objection, we are going to stop the deposition and call the board and we will use our full time. We are trying to wrap this up.

MR. JOHANNINGMEIER: You are not. And first off, you asked this question, this is not a fair question. I'm making the objection. It's not coaching him. He is going to answer. Okay? The fact that I think it's an unfair question isn't going to change his answer. I'm not trying to coach him in any way.

MR. MELWANI: Let's take a ten-minute break. Will, can you send Corey the Pevarello v. Lan decision for him to read?

MR. JOHANNINGMEIER: No. I'm familiar. Listen, I will back down. You can ask the question. He can answer the question. All right? This is not appropriate and so I'm making an objection for the

record. That's all. All right?

MR. UHR: Your objection is fine. What is meant by the claim language couldn't be more relevant to this proceeding. So we will take the witness' answer and note your objection. Thank you.

MR. JOHANNINGMEIER: He is not here to argue about objections. It's not relevant because it's not in his declaration anywhere. Whether it's relevant to the proceeding in general is a question that, you know -- it's, it's not relevant to this deposition. He can answer it. I'm going to let him speak. I'm not telling him not to answer. I haven't done that.

All day long you have been doing outside of scope questions. I'm objecting. I will continue to do that. He is going to answer the question. We will be fine. I just want to be strong in objecting to this whole line. We are not going to do claim construction here today.

MR. MELWANI: We understand. We noted your objection. We are going to continue with the questions.

MR. JOHANNINGMEIER: Okay.

MR. MELWANI: Dialogue like this has been deemed inappropriate, so why don't you continue with the questions.

MR. JOHANNINGMEIER: The board can read it and they can understand why and it will be fine. All right? Let's move on.

A Mr. Uhr, could you perhaps give me the question again?

Q Of course.

So, Dr. Larson, I was pointing to the very last portion of claim eight. It says: "Thereby causing a drive current of the one or more of the plurality of circuits to be decreased," and you see that; right?

A Yes. It's the final sentence in the patent.

Q Okay. And the term drive current, what would a person of ordinary skill in the art understand that that means?

MR. JOHANNINGMEIER: Objection.

A Well, you know, a person of ordinary skill

in the art would think of drive current as like your, you have a source of power, you know, a voltage source. It's an AV voltage source or it's providing a signal of some kind and the drive current is the current that that source provides to drive the load, the AV current that is required to drive the load. So it's an AC current supplied by a source to drive a load.

Q And what is the difference between a bias current and a drive current?

MR. JOHANNINGMEIER: Objection.

A Well, drive is usually associated with like some kind of a transient or some kind of a signal, whereas, you know, DC bias is unchanging.

Q Can both a bias current and a DC current exist in a circuit?

A Can both a bias current and a DC current exist?

Q I'm sorry. I phrased that wrong. Could both a bias current and a drive current exist in a circuit?

MR. JOHANNINGMEIER: Objection.

A Yeah, a bias current and a DC current could exist in a circuit, in a big circuit, yes.

MR. UHR: Okay. Counsel, we would like to take a five-minute break here just to collect our thoughts and then reconvene if that's okay.

MR. JOHANNINGMEIER: Sure.

MR. UHR: Thank you.

VIDEOGRAPHER: We are now off the record at 4:19 p.m.

(Recessed at 4:19 p.m.)

(Reconvened at 4:30 p.m.)

VIDEOGRAPHER: We are now back on the record at 4:30 p.m. You may proceed.

MR. UHR: Counsel, we have no further questions for the witness on cross-examination.

MR. JOHANNINGMEIER: Okay. Well, I'll just lodge an objection that I think less than 10 percent of your questions were actually legit cross, but we don't have any questions at this point, so we are done.

VIDEOGRAPHER: This now ends the deposition of Dr. Larry Larson. We are off the

record at 4:30 p.m.

(Whereupon, at 4:30 p.m., the deposition of LAWRENCE E. LARSON, Ph.D., was concluded.)

* * * * *

A C K N O W L E D G M E N T O F D E P O N E N T

I, LAWRENCE E. LARSON, Ph.D., do hereby acknowledge I have read and examined the foregoing pages of testimony, and the same is a true, correct and complete transcription of the testimony given by me, and any changes or corrections, if any, appear in the attached errata sheet signed by me.

_____ _____

Date LAWRENCE E. LARSON, Ph.D.

UNITED STATES OF AMERICA)

ss:

DISTRICT OF COLUMBIA)

I, ROBERT M. JAKUPCIAK, an RPR and Notary Public within and for the District of Columbia do hereby certify:

That the witness whose deposition is hereinbefore set forth, was duly sworn and that the within transcript is a true record of the testimony given by such witness.

I further certify that I am not related to any of these parties to this action by blood or marriage and that I am in no way interested in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 23rd day of April 2024.



_____

My Commission Expires:

February 28, 2029

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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.

DISCLAIMER: THE FOREGOING FEDERAL PROCEDURE RULES ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY. 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.

Veritext Legal Solutions is committed to maintaining the confidentiality of client and witness information, in accordance with the regulations promulgated under the Health Insurance Portability and Accountability Act (HIPAA), as amended with respect to protected health information and the Gramm-Leach-Bliley Act, as amended, with respect to Personally Identifiable Information (PII). Physical transcripts and exhibits are managed under strict facility and personnel access controls. Electronic files of documents are stored in encrypted form and are transmitted in an encrypted

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