In the Matter Of:

APTIV SERVICES US v

MICROCHIP TECHNOLOGY, INC.

DR. MICHAEL CHEN

December 04, 2024



UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD
CASE NO. IPR2024-00646
PATENT NO. 9,471,074

APTIV SERVICES US, LLC,

Petitioner,

vs.

MICROCHIP TECHNOLOGY, INC.,

Patent Owner.

REMOTE VIDEOTAPED DEPOSITION OF

DR. MICHAEL S. CHEN

Wednesday, December 4, 2024

9:08 a.m. (PT)

Reported Stenographically By:

Joan Ferrara, RMR, FCRR

Job No. 2024-965169

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December 4, 2024
9:08 a.m. (PT)

Videotaped Deposition of
DR. MICHAEL S. CHEN, held remotely via Zoom, before Joan Ferrara, a Registered Merit Reporter, Federal Certified Realtime Reporter and Notary Public.

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REMOTE APPEARANCES:

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ALSO PRESENT:
ADRIAN BELTRAN, Videographer

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	MR. JENSEN	7

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(REPORTER'S NOTE: All quotations from exhibits are reflected in the manner in which they were read into the record and do not necessarily denote an exact quote from the document.)

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THE VIDEOGRAPHER: Good morning, everyone. We are on the record on December 4, 2024, at approximately 9:08 a.m. Pacific Time, for the remote video deposition of Dr. Michael S. Chen, in the matter of Aptiv Services US, LLC versus Microchip Technology, Inc.

My name is Adrian Beltran and I am the videographer on behalf of Lexitas.

Now, will counsel please state their name, firm, and who they represent on the record?

MR. JENSEN: This is Travis Jensen. I represent the Patent Owner, Microchip Technology Incorporated, and I'm with the law firm Orrick Herrington & Sutcliffe.

MR. LIU: This is Stephen Liu, from Morrison & Foerster, representing Petitioner. Also with me in the room is Alex Yap of Morrison & Foerster.

THE VIDEOGRAPHER: Thank you, counsel.

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Now, will the court reporter please swear in the witness or affirm the witness.

DR. MICHAEL S. CHEN,

called as a witness, having been duly sworn by a Notary Public, was examined and testified as follows:

EXAMINATION BY

MR. JENSEN:

Q. Good morning. My name is Travis Jensen. I represent the Patent Owner in this IPR proceeding and I will be taking your deposition today.

Before we get going, I wanted to say thanks for accommodating this deposition. It sounded like there may have been some scheduling challenges, and we do appreciate that. I apologize that I can't be with you there in person but there is the way that the scheduling worked out.

Could you state and spell your name?

A. Michael Shuo-Wei Chen. Michael, M-I-C-H-A-E-L. Shuo-Wei, S-H-U-O dash W-E-I. Last name Chen, C-H-E-N.

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Q. And is it Dr. Chen?

A. Yes.

Q. Okay. Dr. Chen, where do you normally reside?

A. In Los Angeles.

Q. And where are you located today?

A. I'm in Los Angeles office of Morrison & Foerster.

Q. Who else is with you today in person?

A. There are two counsels here in the room. One is Stephen Liu, the other one is Alex Yap.

Q. And I'm not physically present with you, correct?

A. Correct.

Q. Dr. Chen, have you been deposed previously?

A. Yes.

Q. Approximately how many times have you been deposed?

A. I have been deposed just one time.

Q. Was that as an expert witness?

A. Yes.

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Q. Was that in a patent case?

A. I think not.

Q. Approximately how long ago was that deposition?

A. I don't recall exactly, but I think it's a few months ago.

Q. Do you recall who the parties were in that case?

A. You mean the companies in that litigation?

Q. Yes, the companies.

A. Okay. It's between Arm, A-R-M, and Qualcomm.

Q. And which party had retained you?

A. Arm.

Q. Was that deposition in connection with an IPR proceeding?

A. No. I don't think so.

Q. Was it for a District Court case?

A. I think so.

Q. Dr. Chen, have you and I ever met before?

A. No, I don't believe so.

Q. So let me go over a few ground rules since you've had one deposition, but

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not many depositions, just to make sure that we're on the same page.

Do you understand that you are giving testimony today for an IPR proceeding?

A. Yes, I understand.

Q. Even though none of us are in a courtroom, are you aware that your testimony may be used as evidence before a panel of judges in this proceeding?

A. Yes.

Q. Is there any reason you cannot give truthful testimony today?

A. No.

Q. Was your prior deposition an in-person deposition or a remote deposition like the one we're doing today?

A. It was in-person deposition.

Q. Since we are doing a remote deposition today, will you let me know if you experience any technical difficulties so we can pause to work those out?

A. So far so good. But if something comes up, yes, I will speak up.

Q. No virtual deposition is complete

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without at least one technical snafu in my experience. So hopefully it goes smoothly.

A. Okay.

Q. So we've provided a set of exhibits to your counsel. Did you get a copy of those exhibits?

A. Yes. I think it's sitting on my right side right now.

Q. And you motioned to it. Looks like some hard copy documents that you have with you, is that right?

A. Yes, yes, hard copies of the exhibits from my understanding.

Q. Okay. We'll probably come back to those in just a minute.

Do you have an electronic version of the exhibits that we sent?

A. Right now, I don't.

Q. Okay. Well, they're available in the chat if -- I just wanted to make sure you have everything that you need and you know you can look at it and you can access it. We will be using sort of the screen share, as we talked about before, to look at exhibits, but I want to make sure that

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you've got either a hard copy or a local version electronically that you can reference.

So if there's anything that you need by way of a document, will you let me know?

A. Okay, I will. But so right now do I need to make sure I have a local copy, electronic copy, or are we just waiting until we proceed?

Q. I think we can wait until we proceed, and your counsel that's there with you, maybe during a break they can plug in a thumb drive or something and make sure you have a local copy as well.

We may have a few additional exhibits that we use. If we do, I'll just drop those into the chat window.

Are you familiar with the Zoom chat window?

A. Yeah, I've used that before. But like I say, if I run into difficulty, I'll ask for help.

Q. Okay. Very good.

There are several participants in

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the deposition today, including a court reporter. For her benefit, can you provide oral answers to my questions so she can write them down.

Did you hear the question?

THE COURT REPORTER: Is he frozen?

A. Sorry, what was the question again?

Q. Sir, we have a court reporter that's writing everything down today. Can you give oral answers, verbal answers to the questions I ask so she can write them down?

A. Yes. I said yes, I can.

Q. Okay. Very good. As opposed to just nodding your head or something, it's hard for her. She can't write that down. So we've got to make sure we've got spoken answers.

A. Of course, yeah.

Q. Okay. The format of the deposition is question and answer. If you find any of my questions unclear, will you let me know so I can try to rephrase or

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clarify?
A. Sure, I will.
Q. Throughout the course of the deposition, counsel for Petitioner may object. If he does so, he's objecting to my question, not your answer.
However, unless you are instructed by your counsel not to answer on the basis of privilege, you must still answer my question even if there is an objection.
Do you understand that?
A. Yes, I understand.
Q. And perhaps most importantly we'll be taking periodic breaks. If at any time you'd like to take a break, just let me know, and we should be able to accommodate as long as there is not a question pending.
Does that sound okay?
A. Yes, sounds good.
Q. Apart from Zoom, do you have any other programs open on your computer?
A. I don't believe so. There is these settings, obviously to pertain on the

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TV, and that's it.
Q. Okay. No files are open, though, right?
A. No, no.
Q. You mentioned earlier that you have some hard copy materials with you, and I can see them in the video there.
Can you tell me at a high level what are those documents that you have with you?
A. I believe they are all the experts that we filed together with our petition, and of course also my declaration report.
Q. Do any of the hard copy materials that you have include notes that you've made?
A. No, I don't believe so.
MR. LIU: Travis, just for the sake of clarity, what he has next to him is exactly what you sent us. We just printed them out.
MR. JENSEN: Okay. Very good. That's helpful. And I don't think we'll use every single one of those

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documents. We don't have enough time for that.
BY MR. JENSEN:
Q. You mentioned, I think you called it an expert report, so let me ask, did you prepare a declaration for this proceeding, Dr. Chen?
A. Yes.
Q. And that declaration concerns the '074 Patent, correct?
A. Correct.
MR. JENSEN: And since I mentioned the '074 Patent, let me just introduce Exhibit 1001, and that's been pre-marked, and that is U.S. Patent 9,471,074.
(Exhibit 1001, U.S. Patent 9,471,074, was remotely introduced.)
BY MR. JENSEN:
Q. And let me go ahead and just try to screen share here to see if this works.
Dr. Chen, are you able to see Exhibit 1001 on the screen share?
A. On the screen, yeah, I see the patent. I don't see the marking 1001.

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Q. I'll zoom out to the bottom.
A. Now I see, yeah. Thank you.
Q. Okay. And you understand this, if I refer to this as the "'074 Patent," you'll understand that I'm referring to U.S. Patent 9,471,074?
A. Yes, I understand.
Q. And the '074 Patent is the patent that was the subject of your declaration, correct?
A. Correct.
Q. Okay. And I'll be asking you a series of questions today related to your IPR declaration, but first I wanted to take one step back.
Is it correct that you are the expert for Patent Owner in two different IPR proceedings?
A. Yes.
Q. And one of the IPR proceedings concerned an ESD, electrostatic discharge patent, and the other one concerned a voltage regulator patent, correct?
A. That is correct.
Q. Our focus today will be on the

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voltage regulator patent, the '074 Patent, but I did want to ask just a question or two more broadly.

In your declaration on the ESD patent, you opined that the claims of that patent were invalid as obvious, correct?

MR. LIU: Objection.

A. Yeah, it's been a while. I kind of don't remember the details.

Q. Did you apply the same standard for obviousness in both of your declarations?

MR. LIU: Same objection.

A. Again, I don't recall the details. It's been a while and I did not review for the purpose of this deposition.

Q. Did you apply a different obviousness standard in your two declarations?

A. Again, I don't remember the details, again because I did not review for the purpose of this deposition.

Q. But we would be able to look at your declaration on the ESD patent to determine whether you used the same

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standard, correct?

MR. LIU: I'll just have a standing objection about questions relating to a different IPR proceeding.

Q. You can answer.

A. Well, I suppose that, you know, you've got provided in that report, you know, you can find some information. But sitting here today, I don't recall the details.

Q. So you don't know, one way or the other, sitting here today, whether you used the same or a different obviousness standard in your two declarations?

A. Because I did not review that, again. So those details unfortunately I don't remember.

Q. Did you give the same care and attention to the preparation of both your declarations?

A. When I was preparing the declaration report, yes, I do pay attention for both, yes.

Q. How many declarations did you

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prepare for this proceeding on the '074 Patent?

A. I believe just this one, the one we're discussing.

Q. You don't recall preparing a second declaration for this proceeding?

A. I think there's another supplemental, you know, submission. But, you know, I can see the declaration as the one that I showed -- you know, in this report where I showed the analysis.

Q. We'll come back to the supplemental declaration later. But I just want to confirm, you did prepare two separate declarations for this proceeding. I'll call it the "main one" and a "supplemental declaration"?

A. Correct, yeah. So that would be the main one and the supplemental is the only one that I worked on for this, yes.

Q. Okay. When were you first contacted about working on this IPR proceeding?

A. For this IPR proceedings, I don't recall the exact date, but I think it might

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be earlier this year or sometime last year, regarding the IPR proceeding.

Q. Who contacted you?

A. Okay, I also don't recall exactly, but since the counsel Stephen Liu and Alex Yap was involved in this procedure, so I wouldn't be surprised if it would be one of them, yeah.

Q. So you said you were contacted sometime in late 2023 or early 2024, is that right?

A. That's what I can imagine, yes, yeah.

Q. When did you first start working on the IPR?

A. Yeah, so that's unfortunately something that I don't recall right now, but I think it might be this year 2024.

Q. Approximately how much time have you spent on this matter to date?

A. I spent numerous hours, but I don't recall exactly how much time that I spent on this case.

Q. Is it more or less than 100 hours?

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A. Again, I don't recall the detail, but I wouldn't be surprised if it's more than 100 hours.
Q. Is it more than 200 hours?
A. Again, I don't recall the detail, yeah.
Q. Is it more than 300 hours?
A. Again, I don't recall the detail, you know, exactly how many hours I spent.
Q. Could it be more than 500 hours?
A. Again, because I don't, you know, recall that, so I could not, you know, comment on that.
Q. Could it be more than 1,000 hours?
A. So yeah, again, I don't recall the exact details, you know, how many hours.
Q. Could it more than 1,000?
A. Well, I guess -- I suppose you can count number of days, right. So if the number of days was even beyond 2023, then I think that would be the upper limit of how much hours that I could possibly spend on this.

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Q. Is it possible you spent fewer than 50 hours working on this case?
A. Again, I wouldn't be surprised, you know, if that's indeed more than 50 hours.
Q. Sorry, I said fewer than 50 hours.
A. Fewer. It's possible. It is possible. But I just don't recall the exact number of hours.
Q. So you don't know if you spent less than 50 hours or more than 1,000 hours working on this case?
A. Yeah, sitting here, you know, I don't, because I don't recall, you know, exactly the time I work on this. So I don't feel comfortable to answer that.
Q. Is the best estimate you can give me between 50 and 1,000 hours?
A. I could not estimate that. I need to see, you know, exact -- if I remember, then I will calculate that for you. But unfortunately, I don't have that recollection.
Q. Are you aware there is a related

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District Court case on the '074 Patent?
A. I don't remember right now. Yeah, I don't -- I don't recall right now.
Q. Do you know, one way or the other, whether the Patent Owner has sued the Petitioner on the '074 Patent?
A. Yeah, I don't -- I don't recall. I'm not sure.
Q. I'll represent to you that there is a District Court case in which the '074 Patent is asserted between the same parties.
Have you done any work on the District Court case?
MR. LIU: I'll caution the witness not to reveal the substance of any privileged information, but you can answer yes or no.
A. Yes, yes.
Q. So you are aware that there is a District Court case because you've done work on it?
A. Yes, yes.
Q. Have you submitted any expert reports or declarations in the District

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Court case?
A. I don't think so.
Q. At least none that you can recall?
A. I don't -- I don't recall I submit a report there. The report I submit in this '074, I think is IPR.
Q. Dr. Chen, what did you do to prepare for today's deposition?
A. So I mainly review the report that I've written just to refresh my recollection. And there's some exhibits that I cite in my report, so I spend a little bit time to refresh my recollection.
Q. Did you review any documents besides your declaration or the exhibits cited in it?
A. No. So I was given whatever that I submitted, amended on this report, and exhibit, and I was -- yeah, I was provided the response from the patent owners, preliminary response.
Q. Did you review the patent owner preliminary response?
A. I glanced through it, but I don't

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focus on those things. I mainly focus on my own report and the citation that I cite in my own report.
Q. Were you provided at any time a copy of the institution decision in this IPR?
A. I think I might have provided -- sorry, they have provided, you know, this document. But again, you know, I don't pay much attention to that. I mainly focus on my own report.
Q. How much time did you spend reviewing your report and its accompanying exhibits to prepare for the deposition today?
A. Yes. So this is fairly recent. So this is why I remember a little bit better. I think in the past, maybe couple of weeks, I was given these documents and I start reviewing these documents, yes.
Q. And how many hours did you spend reviewing the documents?
A. Again, I don't know the exact number, but I wouldn't be surprised if it's tens of hours.

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Q. Did you read your entire report to prepare for today's deposition?
A. My report, yes, I tried to read all the pages of the report, yes, in my report.
Q. Did you speak with anyone to prepare for today's deposition?
A. I work with counsels, you know, to prepare for this deposition today, yes.
Q. And which counsel did you meet with?
A. Stephen Liu, sitting here.
Q. Did you meet with any other counsel to prepare for the deposition?
A. Yes. There are also a couple more, Alex Yap and Mehran -- and unfortunately, I forgot his last name.
Q. Apart from those three attorneys, did you meet with anyone else to prepare for today's deposition?
A. No.
Q. How many meetings did you have with those attorneys to prepare for your deposition today?
A. Couple. Two, three meetings.

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Q. In aggregate, how long did you spend in meetings with those attorneys?
A. I think probably a little bit more than 10 hours, you know, around that range.
Q. Did you review any deposition transcripts to prepare for your deposition today?
A. No. Deposition transcript, no. This is the first time I do this deposition, right, for this case, yeah.
Q. Did you read the deposition transcript of anybody else to prepare for today's deposition?
A. No. I cannot remember.
Q. Did you read the '074 Patent to prepare for today's deposition?
A. Yes, the '074 is also part of the exhibit that I cite, so yes.
Q. Before being contacted about this case, had you ever heard of the '074 Patent?
A. No.
Q. Do you know who Dr. Greg Taylor is?

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A. No.
Q. Do you know who Dr. Stanley Shanfield is?
A. No, doesn't ring a bell.
Q. Do you know who Raul Perez is, R-A-U-L, P-E-R-E-Z?
A. No, I don't believe so.
Q. Do you know who Hoi Lee is, H-O-I, L-E-E?
A. Hoi Lee? Yeah, I think it's a professor, right, Hoi Lee. Yeah, I'm not sure if that's the same Hoi Lee, but I know there is a professor name Hoi Lee.
Q. Do you know what university he's at?
A. Is it Texas? Yeah.
Q. Do you know who Shilong Zhang is, S-H-I-L-O-N-G, Z-H-A-N-G?
A. Sorry, can you please repeat the first name again?
Q. Shilong?
A. Shilong?
Q. S-H-I-L-O-N-G.
A. No, that doesn't ring a bell.
Q. How about Radu Iacob, R-A-D-U,

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I-A-C-O-B?
A. No, I don't recall.
Q. Do you know who Philip Allen is?
A. I don't know him in person, but yes, I know he's a professor.
MR. JENSEN: Let me go ahead and share the '074 Patent on the screen again.
Q. Are you able to see that, Dr. Chen?
A. Yes, I can see that on the TV, yeah.
Q. And do you see that there are five inventors listed on the '074 Patent?
A. Yes, I can see that.
Q. I'll just ask you, rather than go through their names individually, do you know any of the five inventors on the '074 Patent?
A. No, I do not.
Q. Do you know who Michael Day is?
A. I cite one of his documents from TI, but I do not know him in person.
Q. Do you know who Mohammed Al-Shyoukh, M-O-H-A-M-M-E-D, A-L, dash,

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S-H-Y-O-U-K-H?
A. No, I do not know him in person, but obviously I cite his document.
Q. Do you know Vadim Ivanov, V-A-D-I-M, I-V-A-N-O-V?
A. Again, I do not know him in person, but I cite his document.
Q. Do you know Cornel Stanescu, C-O-R-N-E-L, S-T-A-N-E-S-C-U?
A. It's the same thing here. I do not know him in person, but I do cite his document.
Q. Do you know Gabriel Rincon-Mora, G-A-B-R-I-E-L, R-I-N-C-O-N, dash, M-O-R-A?
A. No, I do not know him, but I do cite his paper.
Q. Have you ever met or spoken with any of the individuals that I just mentioned?
A. No, I did not.
Q. Do you recall when the '074 Patent application was filed?
A. I don't recall, but I suppose that's probably on the patent.
Q. Yeah, we can just take a quick

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look at that.
A. Sure.
Q. Do you see that it has a filing date of March 11, 2014?
A. Yes, I see that.
Q. And it has a provisional application filing date of March 14, 2013?
A. Yes, I see that.
Q. Who are the leaders in USB voltage regulator design in the late 1990s through 2013?
MR. LIU: Objection.
A. Yeah, I'm not sure what's the definition of leaders, but there are numerous researchers, you know, along the lines of the few names that you have mentioned, and the industry also -- regulators use a lot of electronics couplement, so a lot of major companies, they also have a lot of, you know, you know, experts, engineers, you know, they work on these regulators.
Q. You mentioned there were companies that were active in this area in that timeframe. Who are some of those

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companies?
A. Like TI, you know, as we just mentioned, right. So this is what we call power management, in the category of power management.
Yeah, so all the major companies, you know, TI, Analog Device, you know, Qualcomm. I wouldn't be surprised that they would, you know, have the efforts, you know, all working on the regulators.
Q. Apart from TI, Analog Devices and Qualcomm, can you name any other companies that were active in designing and selling USB voltage regulators in the late 1990s through 2013?
A. Yeah, I don't recall the exact details, you know, around that timeframe.
Q. Can you give me the names of any individuals who designed voltage regulators for those companies in the timeframe we're talking about?
A. No, I cannot provide that, you know, sitting here today.
Q. Do you consider yourself a leader in USB voltage regulator design in the late

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1990s through 2013?
A. Again, I'm not sure what's the definition of "leaders," but regulators is such a fundamental circuit building blocks in all the circuits that we build. So all the project, you know, including the ones that I built, you know, around that timeframe because that's the year 2000, that's where I start my Ph.D. program.
You know, I did assign those regulators for many of the projects, you know, including the one that work in industry, we also built regulators and I also built some of the regulators in the company.
Q. What voltage regulator did you design for industry?
A. Linear regulators.
Q. Just to make sure I understand, have you designed a voltage regulator that was commercially manufactured and sold?
A. Yes.
Q. For what company?
A. In Atheros Communications. That's where I worked, I believe, from year

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2006 to maybe 2010. It should be on my CV, but yeah, I think that's the years that I remember.
Q. What was the product name that you designed?
A. Okay. I don't recall the product name, but that's part of the communication ICs.
Q. Was the voltage regulator you designed sold as a standalone product or was it incorporated in a larger product that was sold?
A. If I remember correctly, that should be incorporated in the larger system, we call SOC. Yeah, so that would be the part of the system on chip system.
Q. Apart from the voltage regulator that you worked on at Atheros, had you designed any other voltage regulators that were commercialized and sold?
A. So Atheros communication is the time that I spend in my career, in the industry. And of course later on, I do consulting services, you know, to the commercial companies. And because

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regulator is such a common block, so a lot of projects that would involve, you know, those kind of regulation.
And also some of the project obviously, you know, when we're doing by research group, you know, we also deal with those regulators.
Q. Is there a shorthand name that I could use to refer to the Atheros regulator that you designed?
A. I don't believe that we keep a particular name for that particular regulators. It's just part of the whole SOC.
Q. Does the Atheros voltage regulator that you designed have an enable/disable functionality?
A. I believe so. That is very common functionality that we build, especially in the commercial product, just to save the power.
Q. What was the communication IC product's name that the voltage regulator was incorporated in?
A. As I mentioned earlier,

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unfortunately I don't recall the name. All I remember is part of the communication I see.
Q. Do you know how much output current the voltage regulator you designed had to source?
A. That's very detailed. Unfortunately, I don't recall.
MR. JENSEN: Let me go ahead and introduce what has been remarked as Exhibit 1002.
(Exhibit 1002, Declaration of Dr. Michael S. Chen, was remotely introduced.)
BY MR. JENSEN:
Q. I'll share that on the screen here. Do you recognize Exhibit 1002 as the expert report you prepared, Dr. Chen?
A. Yes, I recognize it.
Q. And if we flip toward the end, the report is dated March 7, 2024, correct?
A. That is correct.
Q. And that's your signature on page 124?
A. Yes, that is my signature.

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Q. For purposes of this deposition, would it be okay if I refer to Exhibit 2001 as your declaration or your report?
A. Counsel, did you say 2001 or 1002?
Q. I said 2001, but I meant 1002. Let me ask the question again. Thank you.
A. Okay.
Q. Would it be okay if I refer to Exhibit 1002 as your declaration or your report in this deposition?
A. Sure, that is fine.
Q. When you submitted your report, did it contain a complete and accurate statement of your opinions regarding the validity of the '074 claims?
A. Yes.
Q. Have any of your opinions regarding validity of the '074 claims changed since submitting your report?
MR. LIU: Objection.
A. No. I said no, not changed.
Q. And you mentioned that you reviewed your report sometime in the last two weeks to prepare for this deposition,

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is that correct?
A. Correct.
Q. In reviewing your report, did you come across any errors, apart from typos, that you would like to correct?
A. No. There's no -- yeah, nothing that I would correct other than the typos.
Q. When preparing your report, were there any materials you would like to have reviewed but did not have access to?
A. I don't think so. All the document I report are the one I cite in my report.
Q. Let me direct your attention to paragraph 2 of your report. Can you just read the highlighted sentence aloud, please?
A. "I am being paid at an hourly rate for my work on this matter."
Q. What is the hourly rate you're being paid?
A. $650 per hour.
Q. Is that your standard consulting rate?
A. Yes, for the legal consulting,

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yes.
Q. Do you have a different rate for non-legal work?
A. That would be different if that goes through the technical consulting, correct. And they may not pay for by hours.
Q. How much have you been paid to date by Petitioner for your work on this case?
A. I don't recall the exact numbers. All I recall is, I submit an invoice and I have not get paid, so...
Q. I didn't catch that last sentence. Can you say that again?
A. I have submitted invoice, but I have not got paid.
Q. Okay. You have not been paid yet?
A. Correct.
Q. You would agree with me that if you had billed 1,000 hours on this case at $650 an hour, that you would be owed $650,000, is that correct?
A. If that's the assumption, yes.

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That's 1,000 hours. 1,000 times 650, yes, that would be the number that you get.
Q. So your report in this case is 124 pages long, correct?
A. Yeah, I cannot read the mark on the bottom, it's very small. 120-something. 123 or 124.
Q. Who wrote your expert report?
A. So I mostly draft the report, and of course I get assistance from the counsels, you know, for the final manuscript.
Q. Who prepared the first draft of your report?
A. I don't recall the detail, but I think I write, especially it's technical, I'm mostly in charge of the technical part, right. So I draft this, you know, technical portions and I may, for example, prepare some figures, but as you can imagine, my figure may not look beautiful, so the team would help me to make it beautiful.
Q. Are there any portions of your report that you did not draft?

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A. I don't recall that much details. But most of the report are technical, so I wouldn't be surprised I actually draft most of these parts.
Q. Did you work with any non-lawyers in preparing your report?
A. I don't believe so, no.
Q. You didn't have, for example, an assistant that helped you?
A. No, no. Myself.
Q. What is the process you followed to prepare your report?
A. So I start out with reading the documents, right. So let's say it's '074, so I need to first read and study this patent. Then I go one by one to form my opinions, you know, from technical perspective.
Q. You started your analysis by looking at the '074 Patent, is that correct?
A. That's what I remember, sitting here, yes, I think I start by '074, I analyze the regulators first.
Q. Did that include looking at the

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claims of the '074 Patent?
A. Well, the claim is at the end of the '074 Patent, right. So yeah, I read the -- I study the entire document, including the claims, yes.
Q. And after you had looked at the '074 Patent and claims, then you went on to look at the prior art?
A. Yes.
Q. Now, what is the title of Section 3 of your report, Dr. Chen?
A. Materials Considered.
Q. And that section of your report includes a table in paragraph 12, correct?
A. That is correct.
Q. Is the table in paragraph 12 a complete list of the materials you considered when forming your opinions?
A. Yes, I believe so.
Q. Which of the exhibits in the table in paragraph 12 were provided to you by counsel?
MR. LIU: Objection.
A. I don't remember.
MR. LIU: I'll caution the

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witness not to disclose the substance of any privileged communications.
A. I'll follow the instructions by my counsel.
Q. Let me ask the question a different way.
Which, if any of the exhibits in paragraph 12, did you identify personally.
MR. LIU: I'll give the same instruction. If you remember, you can identify ones that you think you located before counsel did.
A. Again, unfortunately, I don't recall. It's been a while. Yeah.
Q. Did you identify any documents in paragraph 12?
A. Again, I don't remember, but I wouldn't be surprised, you know, if actually some of this, or even all of this, you know, was identified by myself.
Q. But you don't know, for example, if you identified the '074 Patent?
A. The '074, you know, obviously when they contact me, they would show me this '074, yeah. But I was mostly

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referring to the other, prior parts.
Q. Well, let's just walk through it one by one. The second one, and this is Exhibit 1003, is the prosecution history of the '074 Patent, correct?
A. The second one on the table, yes, I read is prosecution history, yes.
Q. Uh-huh. Was that provided to you by counsel?
A. I wouldn't be surprised if that's provided by counsel because it's not something that I can search or at least I know how to search.
Q. And Exhibit 1004 is the Al-Shyoukh reference, correct?
A. Correct.
Q. Did you identify the Al-Shyoukh reference or was it provided to you by counsel?
A. I don't remember.
Q. Exhibit 1005 is the Ivanov reference, correct?
A. Correct.
Q. Did you identify the Ivanov reference or was it provided to you by

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counsel?
A. I don't remember.
Q. Exhibit 1006 is the Stanescu reference, correct?
A. Correct.
Q. Was the Stanescu reference identified by you or provided to you by counsel?
A. Again, I don't remember.
Q. Exhibit 1001 is a Micrel data sheet, correct?
A. Yes, correct.
Q. Was the Micrel data sheet a document that you identified or was it provided to you by counsel?
A. I don't remember.
Q. Exhibit 1013 is the Rincon-Mora patent, correct?
A. Correct.
Q. Was the Rincon-Mora patent provided to you by counsel or was it a reference you identified?
A. I don't remember.
Q. Exhibited 1014 is the Rincon-Mora paper, correct?

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A. Correct.
Q. Was that a document provided to you by counsel or did you identify the Rincon-Mora paper?
A. I do not remember.
Q. Exhibited 1017 is a Texas Instruments paper that you refer to as Day, correct? Do you see Exhibit 1017 listed, Dr. Chen?
A. Yes, 1017, I see it that, yes.
Q. Was Exhibit 1017 a reference you identified or was that provided to you by counsel?
A. I don't remember.
Q. Is it possible that every one of the exhibits listed in your Materials Considered was provided to you by counsel?
A. Again, I don't remember.
Q. And because you don't remember, is it possible that all of the documents in your Materials Considered List were provided to you by counsel?
A. I don't want to speculate, but I just don't remember. So I cannot -- I don't feel comfortable to answer that

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question.
Q. You can't say, one way or the other, whether counsel provided all of the exhibits in your Materials Considered to you, correct?
A. I cannot speculate that, yes.
Q. Have you reviewed the IPR petition in this proceeding?
A. The IPR petition? I've reviewed the declaration report. That's what I remember because that's me, right, the one that we're seeing here.
Q. Do you know what -- I'm sorry, go ahead.
A. Okay. No, no, no. So is that the one you were asking?
Q. No, I'm not asking about your declaration.
Do you know what an IPR petition is?
A. I'm less familiar, unfortunately. But as I mentioned earlier, I focused mostly on this, you know, basically on this declaration report.
MR. LIU: Travis, we've been

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going about an hour. I don't know if this is a good spot for a break.
MR. JENSEN: Yeah, let me just finish one or two more questions.
MR. LIU: Sure.
Q. Let me direct your attention, Dr. Chen, to paragraph 13 of your report and ask you to read that aloud.
A. "I have also reviewed the petition for IPR of '074 Patent, to which my declaration relates."
Q. Does that refresh your recollection as to whether you have reviewed the IPR petition in this proceeding?
A. Well, since I put it here, you know, I wouldn't be surprised that I should reviewed, you know, during the preparation. It's just that, sitting here, I don't recall exactly what day and what time I actually reviewed it.
Q. Did you review the IPR petition before or after you had prepared your expert report?
MR. LIU: Objection.

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A. I don't remember.
MR. JENSEN: Would you like to take a break, Dr. Chen?
THE WITNESS: Sure, that would be great.
MR. JENSEN: Let's go off the record.
THE VIDEOGRAPHER: The time is 10:11 a.m. and we are going off the record.
(Recess taken from 10:11 a.m. to 10:22 a.m. PT)
THE VIDEOGRAPHER: The time is 10:22 a.m. and we're back on the record.
BY MR. JENSEN:
Q. Welcome back, Dr. Chen.
A. Thank you.
Q. Did you talk with your lawyers during the break?
A. No.
Q. Sir, you mentioned earlier that there were no non-lawyers that assisted in preparing your report, correct?
A. Correct.

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Q. And that you did receive some assistance from petitioner's counsel in preparing your report, correct?
A. Correct.
Q. Let me screen share your report and I want to direct your attention to Section 4.
Do you see that?
A. Yes, I see Section 4.
Q. And that section spans from paragraph 14 to paragraph 17, correct?
A. That is correct.
Q. Is Section 4 of your report where you set forth your understanding of the relevant legal principles?
A. Yes, that's the definition and standards.
Q. Was this section of your report provided to you by counsel?
A. It is very legal. So I wouldn't be surprised it is provided by the counsel.
Q. And you're not a lawyer, correct?
A. I'm not a lawyer.
Q. And so you relied on counsel to inform you of the legal principles to use in preparing your report?
A. Correct. I say correct.
Q. Could you read paragraph 14 aloud, please?
MR. LIU: Travis, can you make it a little bit bigger when you ask him to read the document -- yeah, thanks.
A. Okay. It's better. Thank you.
So paragraph 14: I have been informed and understand that claims are construed from the perspective of a POSITA at the time of the claimed invention, and that during inter partes review, claims are given their broadest reasonable construction consistent with the specification.
Q. Did you apply that legal principle in preparing your expert report?
A. No.
Q. Then why did you list it in your report?
A. This is part of the legal, right, it is a legal document. So as I mentioned earlier, the legal part, I relied on the counsels of the team.

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Q. And did you apply this legal principle when preparing your report?
A. No.
Q. What legal principle did you apply?
A. As I mentioned earlier, I mentioned on the technical analysis. So all the parts I provided in my report are technical.
Q. How did you determine what meaning to give the claim terms?
A. Sometimes I will be informed by the counsel. For example, some portion had been informed by the counsel that, you know, the argument by patent owners. So that's one example. And some obviously is technical, what is a transistor. So I know what is transistor because of my profession. So technical, I can handle pretty much myself.
Q. Do you know what the term "claim construction" refers to?
A. Again, I'm not sure, so I don't know what's a legal definition, but I don't believe I'm involved in any claim

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construction in my report.
Q. So let me break this down into two pieces.
The first question is, do you know what claim construction is?
A. Again, I'm not a lawyer, so I don't know what's the legal, the official legal definition of the claim constructions.
Q. If you don't know what claim construction is, how do you know whether you performed claim construction or not?
MR. LIU: Objection.
A. I meant the legal definition of legal -- of claim construction.
Q. What is your non-legal understanding of what claim construction is?
A. Explanations of the claim.
Q. Using that definition that you just provided, did you perform claim construction in your expert report?
A. Again, I did not do claim construction in my report.
Q. So you didn't provide an

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explanation of what the claim terms mean in your expert report?
MR. LIU: Objection.
A. Again, I'm not a lawyer, so I'm not sure about the legal terms. But as I mentioned earlier, you know, some of the terminologies is very technical, like what is transistors, so I know that from my profession, so that's how I interpret.
Q. Apart from Section 4 of your report from paragraphs 14 to 17, did you rely on any other information that was provided to you by counsel when preparing your report?
MR. LIU: Objection. And I'll caution the witness not to reveal the substance any privileged communications.
A. Yeah, I don't remember. I think you may need to point me in specific paragraph.
Q. We'll come back to that line of questions in a few minutes.
While we're still on paragraph 14, is there anything that you disagree

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with in paragraph 14 of your report?
A. I just read paragraph 14. Yeah, that's what I put in my report. Yeah, I don't think of any.
Q. In paragraph 14, you reference what you call the broadest reasonable construction.
Do you see that?
A. Yes, I see the highlighted, "broadest reasonable constructions."
Q. Did you apply the broadest reasonable construction standard when drafting your expert report?
A. No, as I mentioned already before.
Q. What standard did you apply when drafting your expert report?
A. Counsel, I was not involved in claim construction. So I was not, you know, involved in any of those.
MR. JENSEN: Well, let's take a look at Exhibit 1022, which has been re-marked.
(Exhibit 1022, First Supplemental Declaration of Dr. Michael S. Chen,

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was remotely introduced.)
BY MR. JENSEN:
Q. Do you recognize this document, Dr. Chen?
A. I'm reading this, it's first supplemental declaration, uh-huh, yes.
Q. And on the third page of this document, it's dated October 24, 2024, correct?
A. That is correct.
Q. And it has your signature on that page as well?
A. Correct.
Q. And what's the title of this document?
A. The title -- sorry, it's really small -- yes, the First Supplemental Declaration of Dr. Michael S. Chen.
Q. Did you prepare this declaration?
A. Because it's very difficult, I believe the counsel on the team helped.
Q. So counsel drafted the declaration for you?
MR. LIU: Objection.
A. They prepared the document.

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Q. Could you read paragraph 2 aloud?
A. Counsel, you want me to read this paragraph 2?
Q. Yes, please.
A. Okay. Paragraph 2: It has come to my attention that my initial declaration in support of this petition, Exhibit 1002, recited an outdated claim construction standard at paragraph 14.
Q. How was this brought to your attention?
A. Because I did not apply this in my analysis. So I rely on the counsel because it's very difficult, as I mentioned before.
Q. You didn't realize on your own that paragraph 14 in your main declaration was incorrect, did you?
A. I was informed by the team, as I mentioned here, I was informed, but because I do not use this for my analysis, so...
Q. Could you read the highlighted portion of paragraph 3 aloud?
A. Sure. Highlighted portion of paragraph 3 is: I have been informed that

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the claims of the '074 Patent should be construed using the same standard applied in District Court. This standard is sometimes referred to as the Phillips standard.
Q. Who informed you that the claims of the '074 Patent should be construed using the same standard applied in District Court?
A. I believe that should be the counsel on the team, but I forgot exactly which counsel.
Q. Did they inform you of that before or after you had already prepared your original declaration?
A. I think it should be after, but I don't recall the date.
Q. Could you read paragraph 4 aloud, please?
A. Sure. Paragraph 4 is: With this understanding in mind, I reviewed my initial declaration, Exhibit 1002, and the opinions set forth therein, including at paragraphs 54 and 55. Applying the same claim construction standard applied in

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District Court, my conclusions are unchanged.
Q. Why did you specifically mention paragraphs 54 and 55?
A. Counsel, I don't remember what's in paragraphs 54 and 55, sitting here.
Q. Well, we can go ahead and take a look at those in your declaration.
I'll just let you kind of look at those, read those to yourself. If you want to look at the hard copy, that's fine. And let me know when you've had a chance to read paragraph 54 and 55.
A. Okay. So counsel, I may need to read the hard copy, if you don't mind.
Q. Yeah, that's fine.
A. Yeah, counsel, I have gone through 54 and 55.
Q. Okay. So I'll ask the question again, which is, why did you specifically mention paragraph 54 and 55 in paragraph 4 of your supplemental declaration?
A. I don't recall the details why we particularly select these two paragraphs. But you can see the language including, you

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know, 54 and 55. So this may be just an example to show that I do not change my conclusion.
Q. What claim limitation is being discussed in paragraphs 54 and 55 of your declaration?
A. Again, I'm not a lawyer, so I don't know what's the official definition of what you call a claim limitation. But all I read here when I just glanced through, the opinions that I provide is more from a technical perspective.
Q. Yeah, and what part of the claim are you discussing in -- strike that.
Do you know what a claim element is, Dr. Chen?
A. Claim element? I'm not exactly sure, but I can guess. It's an element or it's a component within a claim.
Q. Do you know what a claim limitation is?
A. Again, I'm not a lawyer, so I don't know the official definition from legal perspective.
Q. Let's go to paragraph 5 of your

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declaration. And can I have you read the first sentence aloud?
A. Sure, if you don't mind zooming a little bit more.
Okay, the first sentence of paragraph 5: I note that some of my opinions assume specific interpretations of claim elements with which I do not necessarily agree.
Q. What did you mean when you used the term "claim elements"?
A. As I mentioned before, you know, I see that as the component, you know, part of the claim.
Q. And in paragraph 54 and 55 of your report, what component of the claim are you discussing?
A. Well, there's a quotation mark discussing, concerning about the terminology, so-called "current buffer driver." So that may be the element or the component that is in this particular claim.
Q. Did you provide a claim construction for the term "current buffer driver" in your report?

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A. No. As I mentioned before, I was not providing claim construction in the report.
Q. Did you change the plain and ordinary meaning of the term "current buffer driver" to perform your analysis?
A. Did I change? I don't think I change. As I just read through this paragraph, you know, all I was saying is just offering my opinion around what conventional people in the art would refer to this buffer.
Q. And in your opinion, would a person of ordinary skill in the art understand a current buffer driver to be something other than a current buffer driver?
A. Sorry, counsel, can you please repeat the question? Did you say that the current buffer driver would be a current buffer driver?
MR. JENSEN: Could the court reporter read the question back?
(The requested portion was read back by the Court Reporter.)

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A. I believe a POSITA would actually rely on the circuits, the actual circuits, you know, to determine what would be a current buffer driver in that case.
Q. Do you think that the '074 Patent changes the plain and ordinary meaning of current buffer driver to something else?
A. Yeah, as I point out in my report, you know, the bottom line is to look at the circuit schematic and I was able to identify the so-called buffer driver, what a circuit schematic actually looks like, and I believe that's what a POSITA would do.
You know, they basically see some name there. Then they will refer to the actual circuit schematic to have the understanding of that, what it suggests. And that's exactly what I did in this paragraph 54 and 55.
Q. If you did not have the '074 Patent available to look at, what is the plain and ordinary meaning of "current buffer driver"?
A. I cannot, you know, provide, you

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know, without those context -- I think people would know that's a buffer. You know, so buffer is a common terminology in our field. So we would know that's a buffer. But exactly what, how are you buffering the signals, I believe the POSITA would have to resort to the actual schematic.
Q. As an expert in the field, Dr. Chen, do you have an understanding of what a current buffer driver is?
A. As I said, you know, the buffer will be the most common ground that I will see. But "current buffer driver," you know, I would have to resort to the actual schematic, you know, for me to understand what exactly the circuit that it referred to.
Q. So without looking at a schematic, you don't know what a current buffer driver is?
A. I wouldn't know exactly what the schematic will be. Yeah, so I do need to rely on that.
But again, you know, the current

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buffer driver, you know, a typical person in the art, you know, can see that there's a buffer in circuitry, you know.

Q. Is "current buffer driver" a term of art?

A. It's not, you know, as concrete as, you know, let's say transistors. If I tell you transistors, that one's very clear, no ambiguity, people know what that refers to. So this sort of logic does not belong to that. So this terminology actually requires additional context for you to make that judgment.

Q. Does the term "current buffer driver" have a plain and ordinary meaning?

A. As I mentioned before, I think to the extent that people would interpret that as a buffering circuits, you know, between the two signal, I think that's what people would take it and then require on further study of the schematic.

Q. What's the difference between a "buffer" and a "current buffer"?

A. They are all buffers. And then we'd need to actually go inside to --

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sorry, not go inside -- we need to check further, investigate further to see how they construct that buffer circuitry.

Q. Are all buffers current buffers?

A. No.

Q. Why not?

A. Current buffer, as I opine in this paragraph 54 and 55.

Q. Just to make sure I got that correct, did you say that -- strike that, I'll just ask a question.

Are all buffers current buffers?

MR. LIU: Objection.

A. No. So as I mention in 54, right, so I say that, you know, the POSITA typically would recognize the buffer as the voltage buffer or current buffer. So generally, they are two different flavors, you can think that way.

Q. What makes a buffer a current buffer?

A. As I mention, I believe in my report, generally people look at impedence, the output impedence of the buffer circuits, right. So the buffer circuits,

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you know, if you have a lower impedence, you know, typically people refer that as a voltage buffer, vice versa.

Q. Is there a difference between -- strike that.

In paragraph 54 of your report, you refer to both a current buffer driver and a current buffer.

Do you see that?

A. I see that.

Q. What is the difference between a current buffer and a current buffer driver?

A. I don't think there's a clear distinction. It's not like you say transistor, as I mentioned before, most transistor people know clearly what you meant. The buffer is the traverse. So it's less clear between those two.

Q. Are you using the terms "current buffer" and "current buffer driver" interchangeably in your report?

A. I don't think so. I don't think that I use them interchangeably, as I mentioned in my report, because I identify the circuits are the same. So I basically

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just stick to this current buffer driver terminology as specified in both sets of reports.

Q. But you also use the terminology "current buffer" by itself, correct?

A. In this paragraph, yes.

Q. In this paragraph of your report, are you using current buffer as a shorthand to refer to current buffer driver?

MR. LIU: Objection.

A. As I mentioned here, right, so the buffer -- so they're buffer circuits, right. So buffer circuits, all I point out in my report is that these buffer circuits, you know, typically they are two different flavors, right. The voltage buffer would have lower impedence at the output and the current buffer would have a higher upward impedence. I think that's all I point out here.

Q. Yeah, and I'm not trying to ask about the voltage buffer. We'll discuss that a little bit later. I'm just trying to understand if you're intending to draw a distinction in your report between a

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current buffer and a current buffer driver.
A. Not specifically. Because you can see current buffer is the first two words of the current buffer driver, right. So that's where I focus on, yeah.
Q. Sir, you're not trying to distinguish somehow between what you call a current buffer and what you refer to as a current buffer driver in paragraph 54?
A. No. This one is just to point out the first -- you know, the description on that buffer, you know, whether that's a current buffer or a voltage buffer.
Q. We'll come back to this in a few minutes. Let's return now to Section 4 of your report.
Again, this is the section where you discuss the legal standards that you applied in your report, correct?
A. Correct.
Q. Are you familiar, Dr. Chen, with the term "burden of proof"?
A. No.
Q. Do you know who bears the burden of proof in this proceeding?

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A. I've not been familiar with those.
Q. The lawyers for Petitioner -- strike that.
Did the lawyers for the Petitioner tell you anything about the burden of proof in this case?
MR. LIU: I caution the witness not to reveal the substance of any privileged communications. I'll also object to the form of the question.
A. Yeah, I don't remember and I'll follow the counsel's instruction.
Q. Did you discuss anywhere in paragraphs 14 to 17 of your report the burden of proof?
A. I don't remember.
Q. Well, you can check right now. It's not very long.
A. Oh, my entire 124 pages?
Q. No, just the legal standard section from paragraphs 14 to 17.
A. Counsel, what's the key word again that you would like me to check?
Q. "Burden of proof."

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A. Burden of proof.
So counsel, I read Section 4. I can see the key word "burden of proof."
Q. And you don't know what the burden of proof is, correct?
A. Correct.
Q. In paragraphs 15 to 17 of your report, you set forth the legal test for obviousness, correct?
A. Counsel, would you mind pointing me which sentence or which paragraph exactly?
Q. Yeah, paragraphs 15, 16 and 17.
A. Okay. What's the key word that you were mentioning?
Q. "Obvious."
A. Obvious. The obviousness?
Yes, counsel, I do see "obvious" in 15, 16, 17.
Q. Do you understand what it means for a patent claim to be obvious?
A. The opinion that I offer in my report of a technical perspective, right, so if that's the particular technique, all circuits, you know, it's obvious to be

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applied, that's -- that would be the obviousness.
Q. And what is the framework that you use for determining obviousness?
A. Well, I think that was described in 16, paragraph 16. So I believe there are four elements. Would you like me to read or -- I don't mind to read.
Q. No, that's okay.
A. Okay.
Q. In paragraph 16, you set forth your understanding of the test, the framework or analysis that you use for determining obviousness, correct?
A. Correct.
Q. And that test includes the four things that you list in paragraph 16, correct?
A. That's correct.
Q. When performing your obviousness analysis, did you apply the four factor framework from paragraph 16?
A. Yeah. So let's look at the four elements. So I can see the prior art, I look at the content of the prior arts

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obviously -- that's not a legal obvious -- the content of the prior arts, the scope that was described by those prior arts, and I look at the differences, so that's item number 2, and I also look at the level of ordinary skill in the art, right, to see what designers in our field will understand, and then any objective evidence of non-obviousness. So four.

Q. Did you consider objective evidence of non-obviousness when performing your obviousness analysis?

A. I don't recall the particular detail. Counsel, if you can point me to a particular paragraph, maybe I can try to remember what, whether that apply.

Q. Do you know what "objective evidence of non-obviousness" is?

A. Counsel, I'm reading the paragraph just to refresh myself.

So counsel, at this point, you know, I don't recall the definition of this.

Q. So you don't know what "objective evidence of non-obviousness" refers to?

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A. No, just at this point, but I wouldn't be surprised that I was informed that, you know, when I was writing it. It's just that now, all of a sudden, I don't recall the details, sorry.

Q. Can you point me to anywhere in your report where you discuss objective evidence of non-obviousness?

A. I -- I don't recall. But if you can help me, you know, if there's a specific paragraph that you think that I should be able to jog, you know, please feel free to do so. But at this point I don't recall particular claim or paragraph that I actually imply this.

Q. Yeah, I couldn't find any either. That's why I was asking you if you could point me to something in your own report where you discuss this aspect of the test for obviousness.

MR. LIU: Objection to form.

A. Yeah, sitting here right now, I cannot, you know, recall particular paragraph at this point. But it is 124 pages. So yeah, I just cannot read that,

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you know, right now.

Q. Do paragraphs 15 to 17 of your report contain a complete statement of your understanding of the obviousness standard?

MR. LIU: Objection to form.

A. So reading here 14 to 17, it talk about the obviousness and that that's what I see right here. And then you say I mention that in other sections, I don't recall.

Q. Do you have an understanding of the obviousness standard beyond what you recite in paragraphs 15 to 17?

MR. LIU: Objection to form.

A. Sitting here, I don't -- I don't remember. But as I said, you know, when I was preparing the report, I work with counsel teams and at that time I may be informed if an aspect of obviousness. It's just that unfortunately sitting here, it's been a while, I really don't.

Q. Were you informed that a patent claim composed of several limitations is not obvious merely because each limitation was separately known in the prior art?

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MR. LIU: Objection to form.

A. I don't recall right now, but I wouldn't be surprised that I was informed the various aspects of obviousness during the report.

Q. Were you informed that hindsight reasoning is not an appropriate basis for combining references to form an obviousness combination?

MR. LIU: Objection to form.

A. Again, I don't remember, sitting here, but I wouldn't be surprised that the counsel team would let me know at the time of the report's preparation.

Q. Do you have an understanding of what hindsight reasoning is?

A. I don't know about the legal definition of this, but I take literally just after the fact.

Q. Using that definition that you just gave, have any of your expert opinions been found to suffer from hindsight bias in a legal proceeding?

MR. LIU: Objection to form.

A. I don't -- I don't think so, no.

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Q. I think we mentioned earlier that you had prepared a declaration for another IPR proceeding on an ESD patent, correct?
A. Correct.
Q. Are you aware of the outcome of that proceeding?
MR. LIU: Objection.
A. No. All I was contact by the counsel team is regarding '074.
MR. JENSEN: I'd like to introduce an Exhibit 2010 and I will go ahead and share that in the chat so you have a local copy.
(Exhibit 2010, Institution Decision in IPR 2024-00803, was remotely introduced.)
A. Sure.
Q. And I'm also sharing it on the screen here.
The question I have for you, Dr. Chen, is, do you recognize Exhibit 2010?
A. What is 2010? Would you mind zooming a little bit more?
Q. Yeah, Exhibit 2010 is the

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Institution Decision in IPR 2024-00803 concerning the ESD patent.
A. Okay. No, I was not aware of this document.
Q. So I take it you have not read this document before, Dr. Chen?
MR. LIU: Objection to form.
A. No.
Q. Let's look at the first page. Can you read the title that I've highlighted on the first page?
MR. LIU: Objection to form.
A. The highlighted text here is: Decision, Denying Institution of Inter Partes Review.
Q. Were you aware before today that the board denied institution of inter partes review on the ESD patent?
MR. LIU: Objection. Counsel, this is outside the scope of the '074 IPR.
A. No, I'm not.
Q. Let's look at the last page of the document. I take it back. The second-to-last page, page 29.

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Do you see the heading 3 titled, "Conclusion"?
A. Yes, I see that.
Q. Can you read the highlighted text under the "Conclusion"?
A. Sure. "Petitioner has not shown a reasonable likelihood of showing that any of the challenged claims are unpatentable. Thus, we do not institute an inter partes review.
Q. Do you know why the board concluded that the claims were not unpatentable?
MR. LIU: Same objection.
A. I do not know.
Q. Let me direct your attention to pages 26 and 27. I'll zoom in. Can I have you read the highlighted text on pages 26 and 27?
MR. LIU: Same objection.
A. Sure: Dr. Chen testifies that the components of the circuit, including resistors, capacitors, and transistors, behave in predictable ways. Exhibit 1002. 203. Yet neither Petitioner nor Dr. Chen

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explains what reason or motivation one of ordinary skill in the art would have had to combine those embodiments. Dr. Chen's conclusory analysis here suffers from hindsight bias.
Q. Were you aware before today that the board found your analysis in the ESP patent proceeding to suffer from hindsight bias?
MR. LIU: Same objection.
A. No.
Q. When you submitted your declaration for the ESD patent, did you think that your analysis was conclusory and suffered from hindsight bias?
MR. LIU: Objection to form.
A. I don't recall. I don't think that, you know, I would think that there was so-called hindsight bias or any other deficiency.
Q. I'm sorry, go ahead.
A. Again, you know, it's been a while. I just don't recall, you know, the contents of that report.
Q. Do you think that any of your

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opinions in the '074 Patent declaration are conclusory and suffer from hindsight bias?
MR. LIU: Objection to form.
A. No.
Q. Let me direct your attention to page 28 in Exhibit 2010 and ask you to read the highlighted text aloud, please.
A. Sure: In the cited paragraph, Dr. Chen refers to the analysis of Claim 6 without providing additional technical reasoning or support from the record. See the document. Dr. Chen's declaration merely repeats the petition's argument. Compare the documents. Thus, Dr. Chen's assertions are entitled to little weight.
Q. Did you think that your opinions for the ESD patent should be entitled to little weight?
MR. LIU: Objection to form.
A. Again, I really don't remember the report of that. So I cannot opine.
Q. Do you think you did a better job in your expert report on the '074 Patent than you did for the ESD patent?
MR. LIU: Objection to form.

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A. It's hard for me to define what is better job or whatnot, but I did try very hard.
Q. Did you apply a different methodology when preparing your '074 report than when you prepared your ESD patent report?
MR. LIU: Objection to form.
A. Yeah, I'm not sure what you mean by "methodology." But to me, I'm a technical person. All I see is circuits. So I analyze, offer my opinion based on the circuits that presented to me. And same for USB and regulator, they are two different circuits, so...
Q. Let me ask the question this way. Did you take a different approach to preparing your '074 declaration than you did for the ESD declaration?
MR. LIU: Objection to form.
A. Again, it's been a while. I don't remember.
Q. In connection with preparing your '074 Patent declaration, were you informed that it can be important to identify a

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reason that would have prompted a POSITA to combine multiple prior art references?
MR. LIU: Object to form.
A. Sorry, counsel, can you please repeat the question again?
MR. JENSEN: Sure. Could the court reporter read that one back, please?
(The requested portion was read back by the Court Reporter.)
MR. LIU: Same objection.
A. Again, it's been a while, I don't recall the detail, but I wouldn't be surprised if I were informed in various aspects that I should pay attention, you know, during the report's preparation.
MR. LIU: Travis, if we're coming up on another hour. So just request a break at a convenient point.
MR. JENSEN: Yeah, let me finish this line of questions.
Q. The reason I'm asking these questions, Dr. Chen, is I'm trying to understand what test you used to determine whether the claims of the '074 Patent were

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obvious.
In paragraphs 15 to 17 of your declaration, you set forth a test that you used and the factors that you considered to assess obviousness.
And what I want to know is, were there other factors, were there other aspects of the obviousness test that you know about, but did not list in your report?
MR. LIU: Objection to form.
MR. JENSEN: Well, let me ask the question, right.
Q. With that background, I'll ask a clean question.
Do you have an understanding of the test for obviousness that is different than the tests you explained in paragraphs 15 to 17 of your report?
MR. LIU: Objection to form.
A. So, as I mentioned earlier, so the obviousness, you know, related perspective was already provided in Section 4, which you and I have been looking at.
At this point I don't recall

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whether there's additional related information, you know, relate to this obviousness.

But as I said, I wouldn't be surprised. You know, when I was preparing this report back then, I was informed with all the different perspectives regarding obviousness.

Q. Is it fair to say that if you were informed of additional information regarding a test for obviousness, that you did not list it elsewhere in your report?

MR. LIU: Objection to form.

A. Can you please repeat the question?

Q. Is there anywhere else in your report that you set forth your understanding of the legal test for obviousness besides paragraphs 15 to 17?

A. Yeah, I think I answered this question before. Yeah, I don't recall. You know, there are 124 pages. I don't recall whether anywhere in a paragraph I mention additional obviousness. So sorry, sitting here right now, I cannot offer that

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answer.

Q. Were you informed that a POSITA must have had a reasonable expectation of success when combining references for a claim to be obvious?

MR. LIU: Objection to form.

A. I don't recall the specific detail, but I wouldn't be surprised if I was told by the counsel during the report's preparation back then.

Q. Did you perform any testing as part of forming the opinions in your opinion?

A. Counsel, can you please define what's "testing"?

Q. Do you have an understanding of what it means to test a circuit?

MR. LIU: Objection.

A. Well, test, you know, I have many different, you know, perspective, you know, when it comes down to circuits, right. So it can be, if I get a chip come back, I go to lab, I test the chip, right. So that's one way of test.

Q. Using that definition that you

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just gave, did you perform any testing when preparing your report?

A. I did not because I don't have the chip of what that particular '074.

Q. Did you simulate any circuits when preparing your report?

A. I don't believe so.

Q. Why not?

A. Well, I don't think there's a need for this. And also, one important factor for me to perform simulation is that I need to be given more information, right. So it's not just look at the schematic of the circuits. I should need to know the device parameter and those details. So those typically were not given by the documents.

MR. LIU: Just a reminder on the request for a break.

Q. And those details that you would have needed to perform a simulation were not included in the Al-Shyoukh or Rincon-Mora references, correct?

A. I don't recall seeing those much details. But again, I don't remember

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every, you know, piece of detail from those documents, yeah.

MR. JENSEN: Let's go off the record.

THE VIDEOGRAPHER: The time is 11:24 a.m. and we're going off the record.

(Recess taken from 11:24 a.m. to 11:36 a.m. PT)

THE VIDEOGRAPHER: The time is 11:36 a.m. and we are back on the record.

BY MR. JENSEN:

Q. Dr. Chen, did you attach your CV to your expert report?

A. I think so. I think that should be in the reports. Let me check. Yes. So in this Exhibit 1002, yeah, I do see my CV, yeah.

Q. And that starts at page 125?

A. Correct.

Q. And I'm sharing this on the screen as well. Do you recognize this as your CV, Dr. Chen?

A. Yes, that is my CV.

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Q. Who prepared your CV?
A. I prepared myself.
Q. When was the last time you updated it?
A. For this particular document or this particular CV?
Q. Yeah, the one that was attached to your declaration.
A. Okay. So I don't remember the exact date of when I updated, but I wouldn't be surprised if it's close to the file date of this case.
Q. Did you --
A. Actually --
Q. Go ahead, I'm sorry.
A. Sorry, sorry. Yeah, you can actually scroll down to the publication sections, you know, because that's where usually I put the latest publication. So maybe we can use that to see when the actual update is.
Yeah, if you can please scroll up a little bit more? Right here, yes.
Yeah, so you can see 2024 February, yep.

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Q. Did you prepare this CV just for this litigation?
A. I generally have a CV that I constantly need to keep prepared, you know, for my profession. I might add more experience section just for this -- for this work.
Q. Are you the inventor on any patent, Dr. Chen?
A. Any of the patent in my CV? If you can please go down. Let's see if there is a patent section.
Yeah, so there are a few patents here, yes.
Q. Do any of those patents disclose a voltage regulator design?
A. So I'm reading. So there were three I list here. Yes, so one is on the TDC -- so that's a clocking circuits, ADC circuits -- and the clocking circuits, no. Yeah, so they are clocking and then a conversion.
Q. Dr. Chen, have you authored any books on voltage regulator design?
MR. LIU: Objection to form.

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A. From my recollection, I don't think I have the books on the regulator by self. But that being said, you know, a lot of this project actually do involve the regulators. So that's to the extent that the regulator was used.
Q. Have you authored any articles on voltage regulator design?
MR. LIU: Objection to the form.
A. Sitting here, I don't recall specifically just on the regulators. But as I said, you know, quite a few of these works, you know, they do involve the regulators. Regulators such a fundamental circuit block, you know, is used in most of the electronics circuits. So even if we sit here, you see the clocking circuits, also these are regulator for that as well.
Q. Were you referring to a specific article in your previous answer?
A. No, just in general, in general, yeah. Because you just put this on the screen. So it just remind me all those blocks you're showing me, you know, that would involve the voltage regulator.

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Q. And your CV includes a section titled Publications, correct?
A. That is correct.
Q. And that's where you list various articles, et cetera, that you've authored?
A. That is correct.
Q. Do any of those articles disclose a voltage regulator design?
A. It was used in many of those chips -- okay, so I work on a circuit, so a lot of our publications entail revealing the circuits, right, the circuit ideas. So oftentimes we need a chip, we actually need to design a chip. So within that, you know, that's where we -- oftentimes we apply the regulators. But it's not necessarily that we would highlight, you know, in the paper.
Q. Can you identify any article in your CV in which you disclose a voltage regulator design?
MR. LIU: Objection to form.
A. The chip, the project that we used here, you know, would entail the regulators. But like I say, you know, I

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don't recall whether we necessarily, you know, emphasize that particular regulator design because as you can imagine, when we populate a paper we focus on just a few blocks that we think we get highest chance to get accepted.

Q. Did any of the articles on which you were an author focus on the voltage regulator block?

MR. LIU: Objection to form.

A. I don't recall the detail, as I said. But a lot of those, they do incorporate the voltage regulators, right, including the one that I just mentioned when I was in industry. I think there were a couple of papers, you know, was published at that time. It just was so long ago, I don't recall whether we particularly highlighted the regulators.

Q. Let's go to paragraph 10 of your declaration. And this is in the section of your declaration titled Qualifications, correct?

A. Correct.

Q. And in paragraph 10 you say: I

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have been teaching various circuit sources at USC, and basic voltage regulator models such as the low-dropout regulator is a common circuit example I use to illustrate for my students how feedback circuits and various related components can be designed and implemented.

Do you see that?

A. Yes, I see that.

Q. What percentage of your instruction time as a professor is spent teaching voltage regulator design?

MR. LIU: Objection to form.

A. I would say it's a lot because regulator is not just a single device, right. So you know there's a build-up to the regulators. You know, you need to understand, you know, feedback circuits. You need to understand how the system operates, right. So a big portion of the course, you know, especially if I teach this electronic class, you know, the entire semester that you teach, you know, is to get the students ready to understand, you know, how the regulators work, right. So

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yeah, it's complicated. So it just takes time to educate the students.

Q. Yeah, and let me distinguish between I think what you said, which is teaching background principles and things of that nature that may be necessary to understand how a voltage regulator works versus actually teaching specific voltage regulator designs.

And the question I want to ask is, how much of your instruction time is specifically spent teaching students voltage regulator design?

MR. LIU: Objection to form.

A. Yeah, like I said, you know, the way that I teach the students, I need to, you know, teach the students with the whole package. You know, I don't generally like the student just to understand one particular circuit, right.

The whole point of my course is to prepare the student to generally understand, you know, a broad set of circuits, right. And the regulatory is such classic circuit examples that we use

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to teach the students various concepts.

So oftentimes, you know, even when I teach, the example I use is regulators, right.

So whenever I, you know, talk about the entire topic, you know, that's all regulators. So that's just the way it works. You know, we are not teaching the data sheet, you know, of the industry parts, right. So yeah, so that's how I see and that's also what I mention here. So a big portion of that is to teach the students to comprehend, to analyze the circuits, regulator circuits.

Q. Do you teach any courses on USB?

A. Again, it's similar. You know, in university we don't particularly teach specific standard. These are not industry. You know, I'm not teaching the class to train an industry engineer. So we don't, we simply don't teach that way.

We, of course, will mention there will be standards, there's a wireless standard, there's a Wi-Lan standard such as USB, you know, among others, right. So in

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that context, you know, we receive that concept.
Q. Do any of your publications discuss USB system design?
MR. LIU: Objection to form.
A. I -- I have less involvement on the system side, like protocol. When I define "system," it's the protocol, right? So it's more circuits. So I do circuit implementation. So we build those circuits, you know, in simulation, in testing and things of that nature. So I'm more physical on our side of things.
Q. Do any of your patents cover USB technology?
MR. LIU: Objection to form.
A. I don't particularly remember, you know, something specific target for a particular standard. But, again, you know, falling back to what I mentioned earlier, teaching is one thing. Whenever I do research, I try to do as generic as possible, right. So the idea is that we do -- can be used for the regulators, can be used for other circuits. So those are

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just fundamental, you know, circuit concepts.
Q. Have you designed a USB voltage regulator before?
A. I have designed numerous regulators, you know, particularly in industry or when I work with industry. I don't recall the details, specific part, but I wouldn't be surprised that some of those regulators end up being used for the industry.
Q. But you can't identify a specific regulator that was designed with the intent to be used as a USB voltage regulator, can you?
MR. LIU: Objection to form.
A. Yeah, right now I don't remember all those different applications. So I couldn't single out particular project with particular standard.
Q. Have you read the USB 2.0 standard?
A. Again, I don't see myself as a system protocol guy. So a lot of those protocol, you know, I don't -- what it

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comes down to is the spec, right. So these regulators, you know, how -- what voltage it needs the regulator, you need the regulator down. So those are sort of the things that we deal at the physical layer.
Q. Let me just reask the question.
Have you read the USB 2.0 standard?
A. I don't remember at this point sitting here. But I might have read at some point during my career. I wouldn't be surprised.
Q. Have you read the USB 3.0 standard?
A. Same thing. I don't recall. There are many standards. But you wouldn't be surprised that I have seen those at some point in my career.
Q. Do you know when the USB 3.0 standard was introduced?
A. I don't recall the exact day or years.
Q. How much current would a voltage regulator in a USB 3.0 compliant product need to source in 2013?

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MR. LIU: Objection to form.
A. Again, because I don't remember the details, I don't recall, you know, sitting here at this point. But I suppose that they would document those -- so all you need to do is just read the documents. That should be part of this.
Q. Let me direct your attention to Section 7 of your report. I'm sharing that on the screen.
What is Section 7 of your report, Dr. Chen?
A. Section 7, the highlighted text is level of ordinary skill in the art.
Q. And that section is one paragraph long at paragraph 38, correct?
A. That is correct.
Q. What factors did you consider when forming your definition of a POSITA?
MR. LIU: Objection to form.
A. Yes. As described in this report, that would at least have a master's degree in EE or bachelors degree in EE or a couple of years of experience working on circuit design.

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Q. So my question is a little bit different. What factors did you consider in coming up with the definition in paragraph 38?
A. What factor?
Q. What factors?
A. I don't recall -- I don't remember what specific factor when I was writing this, but I wouldn't be surprised, you know, if the team actually helped out, you know, also, you know.
Q. What do you mean when you say the team helped out?
A. The team helped out on what typical person of ordinary skill in the art, maybe, you know, in a case like this.
Q. Did the team provide you with the definition in paragraph 38?
MR. LIU: I caution the witness not to reveal the substance of privileged communications.
Otherwise, you can answer.
A. No.
Q. Did you come up with the definition in paragraph 38 for a POSITA?

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A. Again, I don't recall the details, but I think the description here in 38 looks reasonable to me, you know. Especially I teach in universities and a lot of times, you know, the students sitting in my class contain a lot of master degree students and a number of those courses I talk about, a lot of those, you know, also include to teach those master's students. So that's a reasonable, you know, expectation, how I considered a person, you know, of ordinary skill in the art.
Q. Did you consider the experience level of the inventors on the '074 Patent when coming up with your definition of a POSITA?
A. Please repeat the question? You said specific for '074?
Q. Did you consider the experience level of the inventors on the '074 Patent when coming up with your definition of a POSITA?
A. Yeah, so again, I don't know the inventors. I did not check his background.

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And all I said here is what I write, I wrote in the field of patent -- or this is what I provide in paragraph 38.
Q. Did you apply the definition of a POSITA in paragraph 38 when forming the opinions in your report?
MR. LIU: Objection to form.
A. Can you please repeat the question?
Q. Did you apply the definition of a POSITA in paragraph 38 when forming the opinions in your report?
A. Yes. That's why I write here in paragraph 38.
Q. Did you render any opinions in your report under a different definition of a POSITA?
MR. LIU: Objection to form.
A. I don't -- I don't remember, but I don't think so.
Q. Under your definition of a POSITA in paragraph 38, are you saying that anyone with a master's degree in electrical engineering in 2013 would qualify as a POSITA?

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A. Yes, that's what I provide in my report.
Q. Would you disagree then with the definition of a POSITA that required a master's degree and three to five years of experience in integrated circuit device design?
A. Well, the definition here is, I think, quite clear. So at least a master's degree. You know, we did not -- if they have a master's agree, they will have more work experience, that's inclusive, right, so...
Here, you know, we just -- that's in the context of this section. You know, we don't say the...
Q. So I'm not sure you answered my question, which is would you disagree with a definition of a POSITA that it required a master's degree and three to five years of experience in integrated circuit device design?
A. Correct, yes. Because it's more stringent than what I provide here, right. So the language I provide here is just at

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least a master's degree.
Q. Did you consider the technical field of the '074 Patent when forming your definition of a POSITA?
A. Sorry, please repeat your question again?
Q. Did you consider the technical field of the '074 Patent when forming your definition of a POSITA?
A. Yes.
Q. And what is the technical field of the '074 Patent?
A. So this is in the general area of analog signal, power management, you know, area. So in this field, that's where usually people discuss the regulators, which is the topic.
Q. And let me direct your attention to the '074 Patent in column 1, at lines 15 to 20.
Do you see that?
A. Yes, I see that.
Q. And this is under the heading, "Technical Field"?
A. Yes. It reads, "Technical

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Field."
Q. And could you read the paragraph under the "Technical Field" heading aloud?
MR. LIU: Travis, it's a little bit cut off on our screen.
A. Okay. So this is better:
The present disclosure relates to USB voltage regulators, and, more particularly, to a USB voltage regulator having a current buffer to reduce compensation capacitor size and provide for a wide range of external compensation capacitor ESR values.
Q. And do you agree with the statement that the '074 Patent relates to USB voltage regulators?
A. Because the '074 Patent describe the regulators targeting for the USB, so I agree that it's related to USB field.
Q. Does your definition of a POSITA require any experience with voltage regulators?
A. Again, you know, if you -- I expect that if you actually had a master's degree in EE you will receive the proper

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training in circuits, in electronics. To me, that will be sufficient, you know, to make the judgment.
Q. Even though your definition doesn't expressly recite voltage regulators, are you saying that a POSITA with a master's degree in electrical engineering would nevertheless have experience with voltage regulators?
A. Yeah. So typically, as I said, you know, a lot of our circuit training course in our university have a master's degree. The instructor would basically train the students, you know, transistor capability of understanding, designing the voltage regulators.
Q. In your opinion, is any USB experience necessary to qualify as a POSITA?
A. I think it's not highly correlated, you know, because there are many standards, you know, in the circuit -- electronics field I should say, right.
So you can design this regulators for many, you know, standards. So USB

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being one, right. There will be a lot more. So they are generic. You know, you can -- you should be able to discern for design or analyze, you know, the regulators for USB or other standard.
Q. When was the last time you read the '074 Patent, Dr. Chen?
A. I guess this morning when you showed me this '074 and also during the deposition preparation I read '074.
Q. Have you read the entirety of the '074 Patent?
A. I believe so. I think I go through the entire patent, right, and then, of course, you know, I focus on the portion that I actually use in my report.
Q. Is there anything you didn't understand in the '074 Patent?
A. I don't recall. But counsel, if you like, you can feel free to point to me that particular passage and you can ask me whether that's indeed the case. But I don't recall at this moment.
Q. Sitting here today, do you think you understand the '074 Patent?

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MR. LIU: Objection to form.
A. Yeah, I understand the '074 Patent, especially in the context of the information that it provides in my report.
Q. What's shown in Figure 1 of the '074 Patent?
MR. LIU: Objection to form.
A. Would you mind zooming a little bit more? Thank you.
Okay. So this is usually what we call as a frequency response. So this one was showing the frequency response of this regulator's design. So that's why you can see, there's again a face and degree shown on the box.
Q. And Figure 1 is labeled in the patent as prior art, correct?
A. Figure 1, the title -- yes, the title says "Prior Art," yes.
Q. Let's go to Figure 1A. Are you able to see that?
A. Figure 1A, yes. It's also prior art.
Q. What's shown in the figure on the right labeled "Tunnel of Death"?

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A. I think they will de-label it, right. So it is tunnel of death. So it shows when the regulator will be stable and when the regulator will not be stable.
Q. Are you familiar with the term "tunnel of death"?
A. It's not a common terminology, you know, but I can understand the meaning.
Q. It's not a term of art, in your opinion?
A. It could be in this particular type of regulators, yes. But it's not as generic as if I tell you it's a transistor. So everybody know what a transistor is.
Q. Would a POSITA and your definition know what the tunnel of death is?
MR. LIU: Objection to form.
A. I cannot speculate on that, but I think by judging by this figures because it shows stability, I would expect that a POSITA would understand what is a stability, what happened at the circuit if I tell you it's not table, a POSITA should be able to understand.

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Q. What's shown in Figure 2 of the '074 Patent?
A. Figure 2, I believe this is what we actually call as a block diagram of the circuits. So you can see different box would show the different building block.
Q. And is the block diagram in Figure 2 an embodiment of the invention in the '074 Patent?
MR. LIU: Objection to form.
A. It shows the implementation, yes, embodiment of that '074. That's what I recall.
Q. Yeah, it's not like Figure 1, which was labeled prior art, correct?
A. Correct, correct, yes. This one is for the circuits that they show in '074, yes.
Q. Okay. And what is shown in Figures 3, 3A and 3B of the '074 Patent?
MR. LIU: Objection to form.
A. So we'll need to check the detail, but I believe those figures represent the different building block that is related to that figure -- was it Figure

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1 or Figure 2 that you just showed -- yeah, the block diagram figure.
Q. Yeah, Figure 2 was the block diagram.
Is Figure 3 a block diagram?
A. No. Figure 3 is, we usually call that circuit schematic.
Q. Is a circuit schematic shown in Figures 3, 3A and 3B an embodiment of the block diagram shown in Figure 2 of the '074 Patent?
A. I think so. I think that will be the embodiment of what that's a block diagram figure.
Q. Do you understand how the circuit schematic in Figures 3, 3A and 3B works?
A. Yes, I think I understand.
Q. Did you simulate the circuit in Figures 3, 3A and 3B?
A. I did not, but Figure 3 and Figure 3B are very straightforward. You know, I wouldn't need a simulation like that for me to understand the circuits.
Q. Did you render any opinion in your report that the circuit in Figures 3,

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3A and 3B would not work?
MR. LIU: Objection to form.
A. I don't recall that I say something that would not work in 3 -- did you say 3A and 3B. But counsel, if you have any particular question regarding to my analysis, you know, feel free to point me to that particular paragraph and hopefully I can answer it.
Q. Let's go to Section 6 of your report. What is the heading of Section 6 of your report?
A. Section 6, the heading is "The '074 Patent."
Q. And this is where you provide a summary of the '074 Patent spanning paragraphs 32 to 37?
A. Yes.
Q. Let me direct your attention to paragraph 33 to the end. And can you read the highlighted text, which is the last two sentences?
A. Sure. If you don't mind, could you please zoom in a little bit more? Thank you.

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"Thus, the patent seeks to push the gate pole of the last stage PMOS power transistor (i.e., the output driver or pass device) to a higher frequency. This, the patent claims, would significantly improve the range of external capacitors with small to large ESR (equivalent series resistance) values that the regulator can accommodate."
Q. Do you agree that pushing the gate pole of the output power transistor to a higher frequency would significantly improve the range of external capacitors with a small to large ESR value?
A. Yes, in general, yes. The reason is that stability shows, you know, if you push that gate pole to be very high, then you have less degradation, when we design the circuits. So you push the high, you worry less about how those frequency poles shift.
MR. LIU: Travis, just a heads-up, I've been informed that lunch is here for us. We don't have to stop right now. But if we could stop sometime around 12:30, I'd

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appreciate it.
Q. Let's go to paragraph 34 of your report and you're still talking about the '074 Patent in this section, correct?
A. Correct.
Q. Can you read the highlighted text in paragraph 34?
A. Sure. In particular, the patent proposes a gm-boost circuit with a gm-boost technique involving a current feedback between the output driver and the buffer. Doing so, according to the patent, reduces the voltage regulator to a pseudo one-pole system that is independent from the output pole changing so long as it falls within the bandwidth of the system, and the range of the ESR is extended along with the output capacitance.
Q. Do you agree that the '074 Patent reduces the voltage regulator to a pseudo one-pole system that is independent from the output pole changing so long as it falls within the bandwidth of the system?
MR. LIU: Objection. Objection to form.

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A. That is my understanding, you know, you push the gape pole. This is consistent to what the paragraph we just saw. You push it very high, you make it a lot more stable. So you're sensitive to what the frequency response variations on the output capacitance is.
Q. Did you review the claims at the end of the '074 Patent, Dr. Chen?
A. I reviewed, yes.
MR. JENSEN: Let me share another exhibit in the chat. This will be Exhibit 2013.
(Exhibit 2013, '074 Patent - Claim 1, was remotely introduced.)
BY MR. JENSEN:
Q. I've shared that on the screen here. Are you able to see that exhibit?
A. Yes. Claim 1, that's what I see.
Q. And I'll represent to you that this is simply the text from Claim 1 of the '074 Patent with the red letters added to identify each of the claim elements.
Do you see that?
A. I see that.

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Q. Okay. And throughout the remainder of our discussion, will you understand that if I refer to Claim Element 1A, that it's referring, for example, to an operational amplifier and so on for the other lettered claim elements?
A. Yes, I understand.
Q. And these are the same letter assignments that you used in your declaration, so there's no change there. I just wanted to make sure that we have this available for reference as we go forward with the deposition.
A. Okay.
Q. Would you agree with me, Dr. Chen, that for the prior art to invalidate a claim, that the prior art must disclose each and every element of the claim?
A. Yes.
Q. Do you have an understanding of the term anticipation, Dr. Chen?
MR. LIU: Objection to form.
A. Yes. So again, you know, I'm not a lawyer, so I don't know -- I'm less

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familiar with the legal definition of that. But "anticipates" just means it's straightforward, you know, it would be a fit to the circuits that we -- or the claim that we see here, the component that we're seeing here.
Q. Do you know what the difference is between anticipation and obviousness?
A. I don't recall the details regarding those.
Q. I'll represent to you that anticipation refers to a scenario where a single prior art reference discloses all of the claim elements.
With that understanding, did you render an opinion in your expert report that any of the prior art references anticipate Claim 1 of the '074 Patent?
A. From what I remember, we combined the prior arts, so...
Q. You never said that a single prior art reference met all of the limitations of Claim 1, correct?
A. Correct.
Q. Okay. Is it correct, Dr. Chen,

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that you always rely on a combination of references for your invalidity opinions in your report?
MR. LIU: Objection to form.
A. Counsel, you may need to point me specific claim, right. So, for example, in Claim 1, yes, so it's combined for Claim 1, yeah. But I think different claim is different. So --
Q. Let's stay focused for now on Claim 1 maybe to keep at that little simpler.
A. Okay.
Q. For Claim 1, what are the combinations of references that you used to say that Claim 1 was obvious?
A. Counsel, may I refer to my report?
Q. Yes.
A. I believe that was cited in my report.
Q. I could point you, if helpful, to paragraph 39 of your report.
A. Yes. Sorry, you said that's page 39 or paragraph 39?

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Q. Paragraph 39.
A. Yes.
Q. So for Claim 1, what are the different combinations of references that you rely on to say that Claim 1 is obvious?
A. Yes, and that's exactly what I was checking. Claim 1, there's Al-Shyoukh for sure. And the other one is -- let me just check -- I think Al-Shyoukh and Ivanov, the Ivanov. So for Claim 1 Al-Shyoukh and Ivanov.
Q. And that's what you refer to as ground 1 in your report?
A. So ground 1, yes. So this Claim 1, yes, is part of the ground 1, correct.
Q. And then in paragraph 39 you also reference a second ground of obviousness, correct?
A. Correct.
Q. And what is the second ground of obviousness that you rely on for Claim 1?
A. Let me check. So Claim 1 of ground 2 in my report, that's Rincon-Mora and Ivanov.
Q. In paragraph 39, you say that --

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or strike that.
You refer to a second ground of obviousness based on three related searches authored by Rincon-Mora, Al-Shyoukh, Ivanov and Stanescu, correct?
A. Correct.
Q. Can you help me understand how you count those to be three references?
A. Oh, yeah, I think that should be two references authored by Rincon-Mora. Yeah, I think this might be a typo.
Q. So how many references are you relying on for ground 2?
A. The combination to the two references by Rincon-Mora, Al-Shyoukh, Ivanov and Stanescu.
Q. So how many references is that, as you count them?
A. So two, you know, combined -- so let's say that's considered one, Rincon-Mora, Al-Shyoukh, Ivanov, Stanescu, so that's four.
Q. So when you said three related references, that was a mistake and it should be four related references?

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A. No, it should be two. So Rincon-Mora references has two. So I remember that should be one is from the paper, the other one is from the patent by Rincon-Mora. So that's one. So that's called one unit, one of Rincon-Mora, right.
And then there's Al-Shyoukh, there's Ivanov, Stanescu. So that's four.
But the first one, we have two.
Q. So this should not say three, that's incorrect, isn't it?
A. Yes, that's a typo.
Q. Okay. So as you count them, because you combine the two Rincon-Mora reference as one, it should really be four references for ground 2?
A. Correct.
Q. Okay. Why do you treat the Rincon-Mora paper and the Rincon-Mora patent as a single reference?
A. From what I remember and we can check if you'd like the details, the circuit that we revealed in the paper on the patent, they obviously the same circuits. So that's why I treat them --

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Q. Then why do you need both references?
A. There were some -- because, you know, when they write patents probably based on the paper or vice versa, right, so they may -- sometimes you know, for the purpose of publishing the paper, you know, we would provide a little bit more description to explain how the circuit works.
So to that extent, you know, even though they are the same circuits, but, you know, you might find a little bit more information, you know, let's say from the paper application, right. So for that purpose, you know, I include both.
Q. Would it be fair to say that in your view the disclosure in the Rincon-Mora patent applies to the Rincon-Mora paper as well?
A. Yes. That's why I see them as one unit or one group.
MR. JENSEN: Let's go off the record.
THE VIDEOGRAPHER: The time is

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12:30 p.m. and we are going off the record.
(Recess taken from 12:30 p.m. to 1:13 p.m. PT)
THE VIDEOGRAPHER: The time is 1:13 p.m. and we are back on the record.
BY MR. JENSEN:
Q. Welcome back, Dr. Chen. I hope you had a nice lunch.
During the break, did you talk about your deposition with your counsel?
A. No.
MR. JENSEN: Let me introduce two exhibits that we've referenced so far in the deposition and these will be pre-marked Exhibit Nos. 1004 and 1013.
(Exhibit 1004, Al-Shyoukh paper, was remotely introduced and provided electronically to the reporter.)
(Exhibit 1013, Patent No. 6,046,577, was remotely introduced and provided electronically to the reporter.)
BY MR. JENSEN:

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Q. Dr. Chen, do you recognize Exhibit 1004?
A. The one that you show on the screen?
Q. Yes.
A. Yes, prior art, yes.
Q. And do you recognize Exhibit 1013?
A. 1013, yes, that's Rincon-Mora's patent.
Q. And the Al-Shyoukh and Rincon-Mora references are the two primary references that you rely on for ground 1 and ground 2 respectively in your report?
A. Yes.
MR. JENSEN: Let me introduce one additional reference that was mentioned earlier as well and that is Exhibit 1014.
(Exhibit 1014, Rincon-Mora paper, was remotely introduced and provided electronically to the reporter.)
BY MR. JENSEN:
Q. Dr. Chen, do you recognize Exhibit 1014?

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A. Yeah, that's Rincon-Mora paper. That's how I cite the report.
Yeah, counsel, I cannot really find a hard copy of those exhibits.
Q. Well, I'm happy to use the screen share or I can drop the soft copy in the chat window as well, if you'd like.
A. Okay. So I find the 14. And then did you also cite 13? Okay, so I have 13, 14 and 4.
Q. Let me direct your attention to Exhibit 2013, which we were looking at earlier. Do you recognize this as Claim 1 of the '074 Patent?
A. Yes, it's Claim 1 of '074 Patent.
Q. Would you agree with me that Claim 1 of the '074 Patent requires a voltage regulator?
A. Yes, it is a voltage regulator.
Q. And the claimed voltage regulator must have all of the other elements numbered A through G in the claim, correct?
A. Correct.
MR. LIU: Objection to form.
Just give me a chance to object.

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Q. And we talked before the lunch break about the concept of anticipation, correct?
A. Correct.
Q. And that's the idea that a single reference that discloses every element of the claim would invalidate the claim, correct?
MR. LIU: Objection to form.
A. Correct.
Q. And did you render an opinion that the Al-Shyoukh reference disclosed every element of Claim 1?
A. I believe it's a combination, right, described before the lunch. It's a combination of Al-Shyoukh and Ivanov.
Q. What claim elements in Claim 1 are missing from the Al-Shyoukh reference?
A. Counsel, let me check my report just to confirm.
MR. LIU: I'll object to the form of the question.
A. So Al-Shyoukh satisfies most of these claims, except for the 1D, the enable/disable function.

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Q. What elements of Claim 1 are missing from the Rincon-Mora reference?
MR. LIU: Objection to form.
A. Yeah, so counsel, the combination for Rincon-Mora is Claim 1D, the enable/disable function.
Q. Are there any other elements of Claim 1 that are missing from either Rincon-Mora or Al-Shyoukh, in your opinion?
A. No.
Q. Let's look at the Al-Shyoukh reference, Exhibit 1004. Can you read the title of that reference aloud, please?
A. Sure: A Transient-Enhanced Low-Quiescent Current Low-Dropout Regulator With Buffer Impedence Attenuation.
Q. I'd like to break that down a little bit. What does transient-enhanced refer to?
MR. LIU: Objection to form.
A. Counsel, I think I may have actually offered that opinions in my report.
Yeah, so, for instance, paragraph 103, you know, I offer that, you know, the

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transient -- it enhanced the transient response of the LDO to changes in the node. Hence, what transient means.

Q. What about the next part of the title in Al-Shyoukh, a low-quiescent current?

Let me start by asking, what does "quiescent current" refer to?

MR. LIU: Objection to form.

A. "Quiescent current" typically means the nominal current that this circuit would need to run. So typically when we design a circuit with low-quiescent current, we just basically try to minimize the assumption of the circuits.

Q. Is a quiescent current measured when the voltage regulator is sourcing current on its output?

A. When it's not sourcing the current at the output.

Q. So the quiescent current refers to the current that is being drawn when the regulator is not sourcing output current?

A. Right, it's not supplying whatever that following circuitry was

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trying to draw.

Q. Is it fair to say that the quiescent current refers to the current being drawn when the voltage regulator is not driving a load?

MR. LIU: Objection to form.

A. Yes. In this context, when it's not drawing, then that's the current...

Q. The next phrase in the title refers to a low-dropout regulator. What does "low-dropout" refer to in the context of a voltage regulator?

MR. LIU: Objection to form.

A. Typically, it means that the output voltage that is produced versus the input voltage of this regulators. We would like that voltage difference to be small, as small as possible.

Q. Did you read the entire Al-Shyoukh reference?

A. I read, of course, the parts that related to '074, but I don't recall whether I, you know, go through every line or every words of this papers. I might have. I just -- I don't remember.

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Q. Which embodiments -- strike that.

Which circuit embodiments in Al-Shyoukh did you rely on for your obviousness analysis?

MR. LIU: Objection to form.

A. I believe in my report, I actually insert the figures whenever I talk about Al-Shyoukh. So, for example, on page 24, that's the embodiment, you know, excerpt from Al-Shyoukh. And that's the one I have on page 24 of my report.

Q. And the embodiment on page 24 of your report, paragraph 51 is Al-Shyoukh Figure 8?

A. That is correct.

Q. In your study of the Al-Shyoukh reference, did you review Table 2?

A. Yes, I'm sure that when I was preparing the report, I reviewed that Table 2.

Q. What is shown in Table 2 of Al-Shyoukh?

MR. LIU: Objection to form.

A. The Al-Shyoukh should be on the last column on the right. So that's

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describe the difference performance comparison with the previous prior arts.

Q. Is Table 2 and Al-Shyoukh providing a comparison of Al-Shyoukh's circuit in the rightmost column with five other voltage regulators in the other columns?

A. Yes, in Table 2 there are five other columns on the left -- or middle, I should say. Those are the prior arts.

Q. What parameters are being compared in Table 2?

MR. LIU: Objection to form.

A. So you can see here they compare different technologies that we use, what the supply voltage is, what's the current, those different aspects, and then the use for comparing the regulators.

Q. What is the parameter being compared on the second row of Table 2?

A. I don't recall that specific parameters. I would need to actually reread this paper, you know, to see exactly what is the parameters.

Q. Do you know what the parameter Iq

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refers to in the fourth row of Table 2?
A. Again. I would need to check the paper again. But typically, the combination is the quiescent current.
Q. Would that be the same quiescent current that we were discussing in the title of Al-Shyoukh?
MR. LIU: Objection to form.
A. Again, I would need to check again, to read the paper again to see the context, but I wouldn't be surprised if that would be referring to the quiescent current.
Q. Why don't you go ahead and review what you need to in the paper to confirm that.
A. Yeah, I see in Section 4, I think that's where they talk about this performance comparisons. That would be on page --
Q. Were you able to confirm, Dr. Chen, that Iq in Table 2 refers to the quiescent current?
A. On page 1740, I see that they provide the definition of Iq being

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quiescent current, Iq. So that's under Figure 13.
Q. Okay. Thank you.
So referring to Table 2, row 4, which has an Iq parameter, what are the units that are used to measure the quiescent current?
A. The units depends on the type of circuits and how large the current that would draw. But in this particular case, you can see the parenthesis shows it's medium.
Q. And that's the lower case M, capital A that you're looking at?
A. That is correct.
Q. Okay. What is the quiescent current shown in Table 2 for the Al-Shyoukh circuit?
MR. LIU: Objection to form.
A. In this table?
Q. Yes.
A. Yes, in this table, it shows 0.02 medium.
Q. Would that be the same as 20 micro amps?

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A. I believe so, 20 micro amp.
Q. What is the next lowest quiescent current reported in Table 2?
A. The next lowest quiescent current in this particular Table 2?
Q. Yes.
A. Yeah. So this one 0.02, that is lower than the other, the other five prior art references here.
Q. And what is the next lowest one after the Al-Shyoukh?
A. Okay. So the next lowest one I believe should be column -- the first column, the first column.
Q. And that one was a quiescent current reported of 23 micro amps, correct?
A. Correct.
Q. Moving to row 5 of the table, the parameter reference there is current efficiency at -- excuse me, I'll start that over.
What parameter is being referenced in row 5 of Table 2?
MR. LIU: Objection to form.
A. So I read the marking here is

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current efficiency at IL percentage.
Q. What does current efficiency refer to?
A. That, again, that specific definition you need to refer to what paper describe.
Q. Yeah. Why don't you take a moment and see if you can find that in the Al-Shyoukh reference.
A. Sure. Let me take a look.
Yeah, so counsel, I checked the hard copy of this. I cannot find the clear definition of this.
Q. Do you have an understanding from the perspective of a POSITA as to what current efficiency refers to in a voltage regulator?
A. So typically they were understand as how much current is supplied by the supply, so it can be battery, somehow supply, and how much current you actually deliver to your load.
So, of course you want it to be as high as possible because that means that, you know, all the energy you have in

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the battery will be delivered to the load. So that's typically what a POSITA will understand.

Yeah, but again, you know, typically when -- you know, it's just with everybody when they write a paper, typically it's better that they define, again, because sometimes people may define it different.

Q. And you didn't see a different definition from the one you just gave in Al-Shyoukh, did you?

A. No. Again, I cannot find such definition here. So that's why I was trying hard to glance through, yeah.

Q. Let me direct your attention to, this is page 9 of Al-Shyoukh just before his conclusion section. In fact, it's the last sentence in that section.

And before I have you read this, let me ask, again, a voltage regulator is it desirable to have high current efficiency or low current efficiency?

A. Typically any circuit, the higher efficiency, the better.

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Q. And the maximum efficiency theoretically possible would be 100 percent of efficiency?

A. Theoretical means that if all the circuit components are ideal, that will be 100 percent, but in reality there's going to be something else.

Q. It can never be over 100 percent, can it?

A. Not that I'm aware of.

Q. You'd be a rich man if you could figure that out.

So could you go ahead and read the highlighted sentence from Al-Shyoukh just before his conclusion section?

A. Sure: Current efficiency above 99 percent is critical if the LDO is designed for portable applications as the current efficiency determines the battery lifetime.

Q. So the metric that Al-Shyoukh uses to determine the adequacy of a voltage regulator for a portable application is a minimum 99 percent current efficiency, correct?

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MR. LIU: Objection to form.

A. I don't think that they read -- at least I don't read this way as a minimum rather than just point out it's critical. So critical to me is important.

Q. So you're saying it's possible that even a slightly lower current efficiency like 98.5 percent could be suitable for portable applications?

MR. LIU: Objection to form.

A. Yeah, I'm not sure what your definition of "suitable" is worth. But, of course, as Al-Shyoukh point out here, if let's say efficiency is lower, let's say 98, whatever that number you call it, then you're going to have less battery life. I think that's basically the consequence.

Q. So let's use the 99 percent critical threshold that Al-Shyoukh states in his paper and look at Table 2.

Using Al-Shyoukh's stated 99 percent threshold for current efficiency, which voltage regulators in Table 2 meet that requirement?

MR. LIU: Objection to form.

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A. So couple of things, counsel. So, first of all, I'm still not reading that as a threshold. You know, it does not read to me like that. You know, rather than Al-Shyoukh just point out it is important parameters to consider.

And number two is that as you probably can read, you see the middle 3 column right there, there is letters called N.A. So that's typically, that means it's not available.

So I'm guessing, I did not check those particular references, it could be possible that they did not report this efficiency in those, you know, references, the prior arts. So unfortunately --

Q. Can you answer the question?

MR. LIU: Objection to form.

A. Sorry, what was the question again?

Q. Yeah, which regulators for which data is available in Table 2 have current efficiency reported of greater than 99 percent?

MR. LIU: Objection to form.

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A. Okay. So if the question is which regulators which have shown in this table shows that more than 99 percent efficiency, that will be the first column and Al-Shyoukh. Those two are the ones that's shown as above this number.
Q. Looking down a couple of rows in the table, the fourth row from the bottom has a parameter T sub R.
Do you see that?
A. Yes, I see that.
Q. What does that parameter refer to?
A. So, counsel, that's where we still need to go back to the context of the paper to see how it's defined.
Q. Okay yeah, take a look.
A. So counsel, the Tr, by reading this papers, Al-Shyoukh calls that a response time. And then there's a definition that they provide. So this is on page 1740 in Section 4.
Q. And in that section they refer to the parameter T sub R, as you said, the response time of the voltage regulator?

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A. Yes. That's what they call it, response time Tr, and there is a follow-up equations to show that.
Q. All other things being equal, is a faster or slower response time more desirable in a voltage regulator?
MR. LIU: Objection to form.
A. Judging from these equations, typically a response time, you know, you go lower, it will be faster. So typically it will be better.
Q. A faster response time is better, you said?
A. It's better typically, yeah, especially if you actually, you know, it's desired to have that.
Q. And is the response time referring to the time required for the output of the voltage regulator to reach a particular level?
MR. LIU: Objection to form.
A. In fact, that's something that I was checking here, but I cannot find the papers, what's showing, you know, exactly what time to what time. Because usually if

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we think that is a settling time, usually you would draw out or annotate in the figure, and I could not find here. All I find is that equation which I just point out to you.
Q. Is it referring to the output of the regulator as opposed to some internal node on the regulator?
MR. LIU: Objection to form.
A. So when it comes to reading here, you know, it did not specify, right. So you can see the equation here is basically three parameters, a function of three parameters.
Q. So you can't tell, one way or the other, by looking at Al-Shyoukh where the response time is being measured from?
MR. LIU: Objection to form.
A. So it depends on how you define response time. So if you define response time as T sub R as defined in this paper, then I think we should go to that equation.
Q. Look at the equation and let me know if you're able to determine where the response time in Al-Shyoukh is being

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measured from.
A. Okay, yeah. So that's what I was going to explain. So typically the response time, you know, if that's in the text, typically a POSITA would actually specify, you know, from a clear definition, okay, it's critical a voltage, on what time point. So let's say if that's the right time, right. So they would say, okay, from this level and go to the other level what's the right time.
Or, alternatively, you can annotate in your transient way form, right, so which is Figure, you know, 11, Figure 12, Figure 13, and that's where I was checking when I was reading, and I just could not find the clear annotation of any response time variable in any sort. So I could not, you know, and actually, you know, offer that judgment at this point by reading this paper.
Q. Let me direct your attention to this equation on page 9 of the reference where it says: The response time equals the capacitor load times the voltage output

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difference divided by the maximum current load.

Do you see that?

A. Yes.

MR. LIU: Objection. Objection to form.

A. Yes, counsel, and that was the equation that I point out to.

Q. Yeah, and looking at that equation, do you have an understanding of where the capacitive load is located on a voltage regulator?

MR. LIU: Objection to form.

A. Counsel, by looking at the equation, the CL by itself does not tell where that capacitor is from. It is likely that CL is a load capacitance, but --

Q. You would agree with me as an expert in the field who has designed a voltage regulator that the capacitive load is most likely on the output of the voltage regulator, correct?

A. It's likely, yes, it's most likely. But all I'm saying whenever I read the scientific papers, I like to really

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hold on to great detail. So I actually need to see exactly where they annotate, right. So that was my -- I wouldn't be surprised that, you know, if that's the load, you know, indeed, refer to the license.

Q. Let's not speculate here. I know you couldn't find the capacitive load in Al-Shyoukh's, but I'll submit it's pretty easy to find in Al-Shoukh Figure 8, which is the main figure you rely on.

Would you agree with me that the capacitive load is located on the output of the voltage regulator, Dr. Chen?

A. Right, right. So thank you, yes.

Q. Okay. Perfect.

A. So this is why I don't remember. That's what I'm in, right, because I need to see the annotation.

Q. Okay. Let's go back to Table 2 now.

A. Sure.

Q. And we're looking at the response time parameter on the fourth row from the bottom.

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A. Yep.

Q. What is the reported response time for the Al-Shyoukh circuit?

A. The response time as defined Al-Shyoukh, T sub R, in Al-Shyoukh is 0.27 microseconds.

Q. All right. Let's look at the bottom row of Table 2 and there is a metric there that is being reported titled "FOM."

Do you see that?

A. Yes, I see FOM.

Q. And what are the units that are used to report FOM?

A. In this case, I believe it's NS, which stands for nanoseconds.

Q. Do you know what the acronym FOM stands for?

A. It should be figure of merit.

Q. And generally speaking, what is a figure of merit?

MR. LIU: Objection to form.

A. Generally speaking, figure of merit is a way for circuit designer to compare a certain performance for a particular type of circuit. So it can be

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regulators, it can be ATC, it can be face lock loop, all kinds of different circuits. So there were certain figure of merit metrics, you know, that established in a community just to compare, you know, between the works.

Q. And let's look at in Al-Shyoukh, in particular, again on page 9, there is a paragraph where Al-Shyoukh describes the figure of merit that he is using for his comparison, correct?

A. Correct.

Q. And he provides a definition for how to compute the figure of merit that he reports in Table 2, correct?

A. Correct.

Q. And is it correct that the smaller the figure of merit, the better the transient response the voltage regulator achieves, according to Al-Shyoukh?

A. Correct.

Q. So using his approach, a smaller number for the figure of merit would be better than a larger number for the figure of merit?

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MR. LIU: Objection to form.
A. In this case, yes. So the smaller, that means that, you know, obviously described here, right, the better the transient response.
Q. And Al-Shyoukh goes on to say with reference to Table 2 that his proposed circuit achieves the smallest figure of merit compared with other reported voltage regulators, is that correct?
MR. LIU: Objection to form.
A. Yes, that's what I read on the paper.
Q. And, in fact, that is what is shown in Table 2, correct?
MR. LIU: Objection to form.
A. In the reported number in Table 2, on the rightmost column which Al-Shyoukh, that one shows the smallest figure of merit when compared to these five.
Q. Let me direct your attention to Exhibit 1013, which is the Rincon-Mora reference.
A. 1013, okay.

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Q. Did you read the entirety of the Rincon-Mora reference?
A. Yes, I believe when I prepared the report, I read this reference.
Q. And is it correct that the main embodiment that you relied on in your report from Rincon-Mora was Figure 3?
MR. LIU: Objection to form.
A. Let me confirm in my report. It appear to be the case, but I just want to confirm.
Yes, so Figure 3 is the one that I cite in my report, yes, that is correct.
Q. When you read the Rincon-Mora reference, was there anything you disagreed with in the reference?
MR. LIU: Objection to form.
A. I don't recall any specific one that I would disagree.
Q. There wasn't anything that you thought Rincon-Mora got wrong?
A. Like I said, I don't recall.
Q. Well, let's maybe walk through some of this.
Let me turn your attention --

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we'll just start in column 1.
In column 1, there is a section there titled, "Background of the Invention."
Do you see that?
A. Yes.
Q. Okay. Why don't you just read the first paragraph of column 1 to yourself and that spans lines 10 to 17 and let me know when you're done.
MR. LIU: Okay.
A. Yes, I've read.
Q. Is there anything that you disagreed with in the first paragraph of the Rincon-Mora reference?
A. Nothing in particular. But again, we need to read the context, right. So this we need to look at, you know, in the context of Rincon-Mora circuits.
Q. Let me go to the first page of the Rincon-Mora reference. Could you just read the title of the reference aloud?
A. Sure: Low-Dropout Voltage Regulators Incorporating A Current Efficient Transient Response Boost Circuit.

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Q. And we discussed in connection with the Al-Shyoukh reference the meaning of low-dropout in the context of voltage regulators, correct?
MR. LIU: Objection to form.
A. Correct.
Q. And that was the same meaning here in the Rincon-Mora reference?
MR. LIU: Objection to form.
A. In general, in this area when we refer to low-dropout, it really means the output of the voltage, difference being small.
Q. And what does current efficient transient response boost circuit refer to in Rincon-Mora's title?
MR. LIU: Objection to form.
A. I don't recall the details of that current efficient part, but I recall the boost circuits, which is what we saw in Figure 3. So I think that's very likely, circuits refer to that part.
Q. Let me take you back to your expert declaration at paragraph 39.
A. Yes, I'm at paragraph 39.

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Q. Yeah, and you describe in paragraph 39 the second ground of obviousness, correct?
A. Correct.
Q. Okay. And you say that there are -- and we talked about whether it's three or four, but you say there are several related references and you go on to list the Rincon-Mora, Al-Shyoukh, Ivanov and Stanescu reference, correct?
MR. LIU: Objection to form.
A. Yeah, so there should be two references authored by Rincon-Mora, Al-Shyoukh, Ivanov and Stanescu.
Q. The question I have is why do you refer to these as related references?
A. I might have mentioned that before, because the circuit that revealed in those two references, they show the same circuit schematic, the same regulators.
Q. So you're not saying that Al-Shyoukh is somehow related to the Rincon-Mora reference, correct?
A. Correct.
Q. And you're not saying that the

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Ivanov reference is related to the Rincon-Mora reference, correct?
A. Correct.
Q. You're not saying -- I'm sorry, go ahead.
A. Correct, yes, sorry. It just means that they are related reference by the author of Rincon-Mora.
Q. So all you're saying is that the two Rincon-Mora references are related to one another, not that the Rincon-Mora references are somehow related to Al-Shyoukh, Ivanov or Stanescu, correct?
A. Correct.
Q. Okay.
MR. LIU: Travis, just a heads-up, we're coming up on an hour -- not quite an hour yet, but maybe time for a break.
Q. You mentioned something earlier, Dr. Chen, that I wanted to ask about. You referred to the term data sheet. What is a data sheet?
MR. LIU: Objection to form.
A. A data sheet usually is when the

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company, so commercial product when they're released, let's say a chip, right, or IC, they usually need to describe what's the functionality, what's the performance related to this particular chip. That is usually what we understand this data sheet.
Q. Have you ever prepared a data sheet before?
A. No, I did not do that myself.
Q. Have you reviewed data sheets before?
A. Yes, in our profession, right, we use -- whenever we need to purchase those chip, you know, we need to understand how that circuit or chip functions, that's where we need to read the data sheet.
Q. Can you estimate how many data sheets you've reviewed over the course of your career?
MR. LIU: Objection to form.
A. I'm guessing that's an enormous number, but I cannot remember on top of my head.
MR. JENSEN: Let me introduce Exhibit 1011 and this is one, again,

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that's been pre-marked.
(Exhibit 1011, Data Sheet, was remotely introduced.)
A. Okay, I see that.
Q. Do you recognize Exhibit 1011, Dr. Chen?
A. I think this is one of the documents that I cite, yes.
Q. And what is Exhibit 1011? If I said 1010, I misspoke. 1011.
MR. LIU: Objection to form.
A. Yeah, so it's showing the title is LDO.
Q. Is Exhibit 1011 a data sheet?
A. Yes, I would think this is a data sheet, yes.
Q. What company is the data sheet in Exhibit 1011 from?
MR. LIU: Objection to form.
A. As is shown on the title page of the data sheet, it's Micrel.
Q. Were you familiar with the company Micrel?
A. I'm not.
Q. Do you know if they're around

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today?
A. I did not check. So I don't know what the updated status is.
Q. What is the date listed in the bottom left-hand corner of Exhibit 1011?
A. The bottom left, I'm reading January 2009.
Q. And you said this is a data sheet that you referenced in your expert declaration, correct?
A. Yes, that's in the report.
Q. Where did you get this Micrel data sheet that you use in your declaration?
MR. LIU: Objection to form.
A. I don't remember.
Q. Did you find this data sheet yourself?
MR. LIU: Objection to form.
A. I don't remember. Yeah, it could be -- yeah, it could be found by myself. I wouldn't be surprised.
Q. And what product is the data sheet in Exhibit 1011 for?
MR. LIU: Objection to form.

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A. Judging by this data sheet, again, this is a standalone LDO component.
Q. So it's for a voltage regulator?
A. Yes, voltage -- the low-dropout regulator.
Q. For what purpose did you rely on this data sheet in your report?
MR. LIU: Objection to form.
A. Okay. So, counsel, that I need to check my report. It should be somewhere.
Q. And I can direct your attention to paragraph 114, if that helps.
A. Yes, I see that, counsel, thank you. Yeah, it's helpful.
Q. So I'll repeat the question.
For what purpose did you rely on the Micrel data sheet in your expert report?
MR. LIU: Objection to form.
A. Yeah, so as I mentioned in my report, when I cite this data sheet, basically I was referring to the capacitors, right, small ceramic capacitor from V-bias to ground to help reduce the

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high frequency noise being injected into the control circuitry from the bias rail and constitute good design practice.
And follow-up, you know, good bypass techniques typically include one large capacitor and smaller valued capacitors in parallel with the larger capacitor to decouple the bias supply.
Q. Are you combining the Micrel data sheet with the Al-Shyoukh reference as part of your obvious analysis or are you relying on the Micrel data sheet to demonstrate the knowledge of a person of skill in the art?
MR. LIU: Objection to form.
A. Yeah, it's more for the later, because adding bypass caps to the biasing line is such a common practice in our field.
In fact, you know, if my students refuse to do this, I would give them a hard time. And I think this data sheet is just assume that purpose, just to show that multiple, you know, documents would come from that basically.
Q. And that's what you're saying in

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the first sentence of paragraph 114 where you say these principles were discussed widely in the art and would have been well-known to a POSITA?
A. Correct.
Q. Okay. Just to make sure I understand this, so you're relying on the Micrel data sheet to demonstrate the knowledge of a POSITA, not as an express combination with Al-Shyoukh?
A. Correct.
Q. Would you consider the voltage regulator in the Micrel data sheet to be a general purpose voltage regulator?
MR. LIU: Objection to form.
A. As I mentioned earlier, I see this as a standalone regulator product. You know, this line, there's a subtle line between how you call the general purpose or specialized purpose. So that really depends on the application, right.
So I think to the extent that, you know, this data sheet, because they do point out a few -- at least suggest a few possible applications. So you may call

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that as a general purpose in the context of those application, I guess.
Q. And you're referring to the seven applications listed on the front page of the data sheet?
MR. LIU: Objection to form.
A. That is one example, yes, yeah. It's very typical in the, quote-unquote, data sheet, yes.
MR. LIU: Any chance of a break, Travis?
MR. JENSEN: Yeah, if you need to take a break, we can go off the record.
MR. LIU: Thanks.
THE VIDEOGRAPHER: The time is 2:20 p.m. We are now going off the record.
(Recess taken from 2:20 p.m. to 2:32 p.m. PT)
THE VIDEOGRAPHER: The time is 2:32 p.m. and we're back on the record.
BY MR. JENSEN:
Q. So before the break, Dr. Chen, we

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were talking about the Micrel data sheet that you relied on in your report and I'd like to direct your attention to page 2 of that data sheet where it shows some pin-outs or what they call pin configurations.
Do you see those?
A. Yes.
Q. Are you familiar with what a pin-out or pin configuration is for an integrated circuit?
MR. LIU: Objection to form.
A. My understanding is that we would usually package the circuits, integrated circuits in a system form and to get a signal in and out, you need a certain pin. So that's the pin-out.
Q. So is pin number 1 in the Micrel data sheet?
MR. LIU: Objection to form.
A. Here, you know, on the paper, it says EN, but I don't recall, you know, the details, what that exactly refer to.
Q. Yeah, let me direct your attention to the next page of the document

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where it defines the pin functions for each pin.
A. Okay, I see that.
Q. And what does it say that the pin function is for pin number 1 EN?
A. The pin function says it's enabled, input signals. And when it's logic high is enabled when logic low is shut down. So this is what I read on the data sheet.
Q. Is it correct then that the Micrel voltage regulator that we're looking at has an enable function?
MR. LIU: Objection to form.
A. For that, I need more context to see exactly what enable function that actually does. But reading the text here, it says "enable."
Q. Do you know what an enable pin does on a voltage regulator?
A. Again, I need to see a more functional description. You know, usually they will say that, you know, when that's enabled, then what corresponding circuit would behave.

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So those typically is the one that I would look for to confirm the actual functionality. But like I say, you know, I read the text here, reading here, it does say that, you know, when that's high, which probably means high voltage is enabled. When it's logic low, which probably means low voltage, it will shut down.
Q. Okay. And let me direct your attention to page 11 of the data sheet where it gives some additional information about this?
A. Page 11, you said?
Q. Yes. And let me know if you see the paragraph titled, "Enable."
A. I do.
Q. Could you read the highlighted description of Enable aloud?
A. Sure: An active high enable input (EN) allows on-off control of the regulator. Current drain reduces to zero when the device is shut down, with only microamperes of leakage current. The EN input has CMOS compatibles thresholds for simple logic interfacing. EN may be

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directly tied to the V-Bias and pull up to the maximum supply voltage.
Q. So what is the function then of the enable pin on the Micrel voltage regulator?
MR. LIU: Objection to form.
A. In this particular regulators, again, you know, it's already described in this text. So when that's enable goes high, it may be directly tied to V-Bias and pull off to the -- yeah, that's to the extent that I read from this data sheet.
Q. And can the enable function reduce the current drain current -- or strike that.
Can the enable function on the Micrel voltage regulator reduce the drain current to zero when the device is shut down with only micro amps of leakage?
MR. LIU: Objection to form.
A. That's what I read here. It says reduce to zero when the device is shut down, and with only micro amps of leakage current. So I think this refers to the shutdown mode.

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Q. Okay. So the Micrel voltage regulator has an enable function that can shut down the device depending on the state of the enable signal?
MR. LIU: Objection to form.
A. Reading what it says here, when that's shut down, the current is reduced to zero. That's what it read. So that is the only information that I would have at this point.
Q. Did you have any reason to believe that the information given in this data sheet is incorrect?
MR. LIU: Objection to form.
A. I wouldn't be surprised that, you know, when I test a chip, it would behave as what the sheet suggest. But I did not test this particular chip myself.
Q. Yeah, I'm not sure I understood that. Let me just ask the question again.
Do you have any reason to believe that the information that we just reviewed in the Micrel data sheet is inaccurate?
MR. LIU: Same objection.
A. I don't know. All I have is the

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information that's provided by this data sheet.
Q. Let me direct your attention to page 4 of the Micrel data sheet and let me know if you see the table underneath the heading, "Electrical Characteristics."
A. Page 4, yes.
Q. And let me ask one other question first. Would you agree with me that not all voltage regulators in the 2013 timeframe had enable functionality?
MR. LIU: Objection to form.
A. I don't know. You know, that require a lot of research on that.
MR. JENSEN: Well, let me share a document in the chat. This will be exhibit 2012.
(Exhibit 2012, Data Sheet, was remotely introduced.)
A. 2012?
Q. Yeah. This one probably is not going to be in your stack because it's a new exhibit.
A. I do not see here.
Q. But it's available in the chat if

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you'd like a local copy. Otherwise, you're welcome to just look at the screen share. Are you able to see Exhibit 2012?
A. I can see on the screen, but the font size is a little bit small.
MR. LIU: I'll object to this line of questioning to the extent that the witness isn't able to adequately review the document.
MR. JENSEN: Well, you can open up the local copy on your computer so you can look at whatever you'd like. So I don't think that's a valid objection. We provided a copy of the exhibit locally.
MR. LIU: Can we take a quick break then to see if we can get it on his screen?
MR. JENSEN: Sure. Let's go off the record.
THE VIDEOGRAPHER: The time is 2:41 p.m. and we're going off the record.
(Recess taken from 2:41 p.m. to 2:43 p.m. PT)

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THE VIDEOGRAPHER: The time is 2:43 p.m. and we're back on the record.
BY MR. JENSEN:
Q. Dr. Chen, do you have a copy of Exhibit 2012?
A. Yes, on my local laptop, yes.
Q. What is Exhibit 2012?
MR. LIU: Objection to form.
A. On the title, it says regulators. That's what I read.
Q. Is it a data sheet for a voltage regulator?
MR. LIU: Objection to form.
A. It looks like a data sheet.
Q. Do you know what company it's from?
MR. LIU: Objection to form.
A. ST, as shown on the title page.
Q. Are you familiar with the company ST?
A. I know the company ST, but is there any specific aspect that you would like to ask about the company?
Q. Yeah. Were they a company that

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made voltage regulators in the 2013 timeframe?
MR. LIU: Objection to form.
A. I did not specifically look for this. But the data sheet that you are showing here, you know, it says ST, and I wouldn't be surprised that's ST.
Q. How many pins are on the ST micro electronics voltage regulator shown in Exhibit 2012?
MR. LIU: Objection to form.
A. Based on the Section 2, pin configuration, I see output, ground and input pins.
Q. Do you see an enable pin?
MR. LIU: Objection to form.
A. Not on this particular pictures, but I don't know whether they may have other configuration that may show enable signals.
Q. What's the date on the front page of the ST micro voltage regulator data sheet in the lower left-hand corner?
A. This one I read May 2012.
Q. Would you agree with me that not

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all voltage regulators in the 2013 timeframe had enable functionality?
MR. LIU: Objection to form.
A. No. I cannot -- I did not do this search, you know, myself.
Q. Is it your testimony, Dr. Chen, that every voltage regulator in the 2013 timeframe had enable functionality?
MR. LIU: Objection to form.
A. I did not say that. You know, all I'm saying is that I did not do this extensive search for those regulators before that time point. That's all I'm saying here, sitting here.
Q. So you don't know, one way or the other, whether there were voltage regulators in the 2013 timeframe that did not have enable functionality, correct?
MR. LIU: Objection to form.
A. All I'm saying is that it requires intensive research and studies, you know, to make that -- to draw that conclusion.
Q. And you didn't undertake those research or studies to figure out the

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answer to that question one way or the other, correct?
A. I did not do that kind of research during the report preparation.
Q. Okay. Let's go back to Exhibit 1011, which is the Micrel data sheet, on page 4.
A. Page 4, yes.
Q. And there's a table there with a number of parameters and values.
Do you see that?
A. Yes, I see the tables.
Q. And about halfway down, there is a row with the parameter V-Bias supply current.
Do you see that?
A. Yes.
Q. What is the V-Bias -- strike that.
What is the maximum V-Bias supply current with an output current of 100 milli amps?
MR. LIU: Objection to form.
A. Could you please repeat the question?

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Q. Let me ask maybe a foundational question.
What does "V-Bias supply current" refer to?
MR. LIU: Objection to form.
A. I would actually need to study what is that V-Bias signal referred to in the context of this regulators.
Q. What is the quiescent current for the voltage regulator in Exhibit 1011?
MR. LIU: Objection to form.
A. I do not recall. As I said, you know, the extent that I was using this particular reference was on the capacitors.
Q. As an expert who, as you testified, has reviewed an enormous number of data sheets, are you unable to look at this data sheet and tell me what the reported quiescent current is?
MR. LIU: Objection to form.
A. Counsel, all I'm saying is that, you know, it just takes time for me to understand and digest and form my opinions. It is not something that I can form my opinions right here, standing here.

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Q. Yeah, I'm not asking for an opinion. I'm asking if you can identify on the data sheet where the quiescent current is reported.
A. Yes. So that's what I meant. I need to study all this, you know -- so there are quite a few pages, right. So it's more than 10 pages. I would actually need to go through all these pages, you know, to study, to understand. Similar to what we did in the previous sessions, I need to understand what's the definition of those terms. I need to understand what are the signals that they're referring to. Whenever you say current, I need to understand what current branch that you're referring to.
So all those kind of details, it just takes time.
Q. Let me see if I can help you out, right, because I don't think this is a difficult question, Dr. Chen.
Why don't you look at page 3 of Exhibit 1011. And do you see in that table there is a pin name V-Bias?

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A. Yes, I see that.
Q. And what is the description to the right of V-Bias?
A. It says: The input bias voltage for powering all circuitry on the regulator with the exception of the output power device.
Q. Does that help you understand what V-Bias refers to in the Micrel data sheet?
A. It helps better than one minute ago, but I would still like to confirm what they meant by all circuitry.
Q. Okay. Why don't you take a moment to do that.
A. So on page 9, I can see the V-Bias signal goes to the three blocks.
Q. So having had a chance to review the document a little further, do you have an understanding of what the V-Bias supply current parameter is on page 4 of the Micrel data sheet?
A. I do not find the specific definitions of this V-Bias supply current, you know, from the document. If you do see

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somewhere, can you please point me to a certain passage?
Q. As an expert and a person of ordinary skill in the art, Dr. Chen, having reviewed the document, do you have an understanding of what the V-Bias supply current is?
A. The conventional understanding of the supply currents, it can mean the current flowing into this V-Bias signals.
Q. And in the table on page 4, there are two entries for the V-Bias supply current.
Do you see those? One is with a load current of 100 milli amps and the other is with a load current of 3 amps?
A. Yes, I see that.
Q. What is the reported maximum V-Bias supply current when there is a load current of 100 milli amps?
A. If you meant the next column?
Q. Yes.
A. By reading this table, it shows -- sorry, you said loading current is 100 milli amp?

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Q. Yes.
A. Okay. So that's, I'm reading on the table, it shows 7.5 milli amp.
Q. And at 3 amps, the maximum reported V-Bias supply current is 150 milli amps, correct?
A. That's also what I read from this table, 150 milli amp.
Q. Would you be able to extrapolate, Dr. Chen, what the V-Bias supply current would be when there is no load currents on the output?
MR. LIU: Objection to form.
A. In the table they only show two loading condition. So I cannot determine when the high load goes to zero.
Q. So you wouldn't be able to extrapolate what the V-Bias supply current would be at no load?
A. I wouldn't extrapolate like that.
Q. And why is that something that you can't do?
A. A lot of times the circuits are showing non-linear behavior.
Q. Would you expect the V-Bias

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supply current at no load to be lower or higher than the V-Bias supply current at 100 milli amp load?
A. If you see the trend, it will decrease.
Q. But you can't say how much it would decrease, correct?
A. I can't say it, yes.
Q. Would you agree with me that the V-Bias supply current with no output load would be the quiescent current of the device?
MR. LIU: Objection to form.
A. It still depends because there are still other portions of the circuits that is not powered by V-Bias. This is where, like I said, you know, I do need to see the full schematic to make that judgment.
Q. So you're saying that the quiescent current could include something in addition to the V-Bias supply current because of other components in the regulator?
A. Correct.

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Q. Okay. Let's go to Exhibit 2013, which is Claim 1 of the '074 Patent.
A. Okay. All right.
Q. And Claim 1, A1 recites an operational amplifier, correct?
A. Correct.
Q. And that's sometimes referred to in the art as an op amp for short?
A. Yes.
Q. What is an op amp?
MR. LIU: Objection to form.
A. Counsel, I recall I have offered that in my report. Let me -- just give me a minute to find it.
Q. I can direct you to paragraph 50, if that helps.
A. Yes, thank you. So it is, indeed, paragraph 50.
So operational amplifiers, a POSITA would have understood, you know, it's a device that receive two input voltages and output voltage that is, multiple of that input voltage.
Q. Does paragraph 50 of your report contain all the requirements to make

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something an op amp?
MR. LIU: Objection to form.
A. That's generally how people -- what I provide here is generally what POSITA will understand. Of course, the actual op amp implementation depends how each designer, you know, would design. But this is the general consensus of what people understand.
Q. Is there any gain requirement for an amplifier to qualify as an op amp?
MR. LIU: Objection to form.
A. I wouldn't call that as a requirement. As I also point out in my report, in general -- generally, people consider operational amplifier is an amplifier with relatively high gain. So that's to the extent that people would understand this so-called operational amplifier.
Q. Does the '074 Patent give a definition for op amp?
A. That, I don't recall. I don't recall. I probably need to go back to '074 and read. While sitting here, I don't

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recall from my recollection.
Q. What is an error amplifier?
MR. LIU: Objection to form.
A. Error amplifiers, in the context of these voltage regulators, it's basically amplified the difference, you know, between the input voltage and the feedback voltage. And whenever we design the feedback loop, you wish to make -- because the difference between that, you know, reference input and the feedback voltage, that's -- you can see, you can think of that as a form of errors. So the amplifier that attached to those two signals, that's typically --
Q. What is the difference between an error amp and an op amp?
MR. LIU: Objection to form.
A. The error amplifier, when we describe as error amplifiers, we describe as a functional, right.
So as I mention, you know, the whole regulator is a feedback loop, right. So in this case, you know, you can't implement the error amplifier using an operational amplifier. So that's how

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typical POSITA would understand it.
Q. And in paragraph 51 of your report, you say that Al-Shyoukh's error amplifier is an operational amplifier, correct?
A. Correct, because in this case Al-Shyoukh implement this error amplifier using an operational amplifier, as I just mentioned.
Q. Are all error amplifiers operational amplifiers?
A. Any amplifier that you can amplify the input signals, you know, that error signal to a larger signal to the output, that would be considered as error amplifiers. All you need to do from signal processing perspective, you just need to amplify the same.
Q. Yeah, I'm not sure I understood that. Are you able to answer the question with a yes or a no? Are all error amplifiers operational amplifiers?
MR. LIU: Objection to form.
A. No. So basically operational amplifier is, indeed, a common

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implementation approach to implement the error amplifier. But I wouldn't be surprised if I see some other in know native way to implement error.
Q. Where does Al-Shyoukh say that its design has an operational amplifier?
MR. LIU: Objection to form.
A. In Al-Shyoukh -- I don't, right away, know on top of my head. That's why I'm checking.
Okay. I just want to say that, you know, it probably will take time for me to read the entire Al-Shyoukh again.
But I just want to point out, you see the schematic that I show in my report on page 26 -- or 24, that's also fine -- yes. You see that yellow circle box, yes.
You know, a POSITA, when they look at this, you know, people would recognize this as operational amplifier.
Q. And that's the point I'm trying to tease out is whether Al-Shyoukh itself says that it has an operational amplifier or whether you're relying on the knowledge of a POSITA for your opinion that

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Al-Shyoukh has an operational amplifier.
And it sounds like you're relying on the knowledge of a POSITA to say that, you know, Al-Shyoukh has an operational amplifier. And I wanted to know, can you identify anything in Al-Shyoukh itself where Al-Shyoukh says it has an operational amplifier?
MR. LIU: Objection to form.
A. Counsel, I'm reading the report again because I cannot remember all the -- every word by word in Al-Shyoukh, so I'm reading my report on page 25.
So you see that page 25 on the top portion, Al-Shyoukh cites various papers relating to operational amplifier to explain its circuit. And that should be on that --
Q. Yeah, I see paragraph 51, but you don't point to anything in paragraph 51 where Al-Shyoukh itself says that it has an op amp, do you?
MR. LIU: Objection to form.
A. Again, counsel, for that I do need to read the entire paper again to look

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for that words.
Q. Okay. Sitting here, without reading the paper again, you can't point me to something in Al-Shyoukh that says it has an op amp, correct?
MR. LIU: Object to form.
A. So counsel, if you're willing to give me time, then I can read the paper again here to look for, you know, where potentially Al-Shyoukh made mention of the operational amplifiers.
But as I hinted in my report, you know, Al-Shyoukh cites various papers that is describing the operational amplifiers to explain the circuit.
Q. Let's go to paragraph 139 of your report and this is the section of your report where you're discussing Rincon-Mora, correct?
A. That is correct.
Q. And you say in the first sentence of paragraph 139 Rincon-Mora's LDO includes an error amplifier, correct?
A. That is correct.
Q. And then if we go to paragraph

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140, you say in the first sentence: Thus, the error amplifier could just as easily have been implemented as an operational amplifier.
Correct?
A. Correct.
Q. And that's because Rincon-Mora did not actually implement an operational amplifier and instead used an error amplifier, correct?
MR. LIU: Objection to form.
A. No. So Rincon-Mora, I point out that he also need error amplifier, just like Al-Shyoukh, just like '074, right. Because error amplifier, as I mentioned earlier, is a way that you describe the signal flow of the feedback loop of the regulators. So they all need error amplifiers.
So it's just a matter of, you know, how you would implement that error amplifier, right.
And as I mention here, in preventing the error amplifier using operational amplifiers, it's a very common

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technique, right. It's a very common technique. So that's why I say that it could have easily been implemented as operational amplifier.
Q. Yeah. Rincon-Mora, you say, could just have easily been implemented as an operational amplifier, correct?
A. Correct.
Q. Okay. And it could have been implemented as an operational amplifier because it wasn't actually implemented as an operational amplifier in Rincon-Mora, right?
A. Can you please repeat that question?
MR. LIU: I'll object to the form.
Q. In paragraph 140, you say the error amplifier could just as easily have been implemented as an operational amplifier, right?
A. Correct.
Q. It could have been an operational amplifier, right?
A. Correct.

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Q. Okay. And the reason it could have been an operational amplifier is because it wasn't an operational amplifier in the first instance.
A. No, no, that's not the interpretation here. The reason why we need to, I need to offer these opinions in my report is because Rincon-Mora here did not specify, you know, that particular error amplifiers.
So if you look at their references, Rincon-Mora's, they would draw a triangle box. The triangle box, you know, in our field would easily be understood as amplifier, right. So that's error amplifiers.
It's just that Rincon-Mora did not reveal the exact schematic of those error amplifiers. It doesn't mean that, you know, Rincon-Mora does not implement that error amplifier using operational amplifier. So that's all I want to say.
Q. But Rincon-Mora doesn't -- well, let me just ask this question. We can go to the Rah reference. This is Exhibit

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1013.

Can you point me to anything in Exhibit 1013 where Rincon-Mora discloses an operational amplifier?

A. Yeah. So you see that in the figures -- if you can please blow up a little bit more, zoom in a little bit more, sorry -- yeah, you see the box number 16? Correct. So that's error amplifiers, right. Because the error amplifiers, you know, in the context of the voltage regulators, you compare the error voltage, you know, which is the between the input voltage and the feedback voltage. On this plot it's shown as node 34, right. So the block 16 is the error.

Q. Does Rincon-Mora call that box 16 an operational amplifier?

A. That I don't recall the details.

MR. LIU: Sorry. Objection to form. Go ahead.

A. I don't recall right now in my he. I do need to search for it.

Q. Let me direct your attention to column 4, lines 33 to 35.

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A. 33.

Q. What does Rincon-Mora call box 16?

MR. LIU: Objection to form.

A. So counsel, do you mind to zoom in a little more or where I can try to find in my hard copy? Is this column 3?

Q. Column 4. And I tried to zoom in. Hopefully you can see that.

A. Column 4. 16 -- yes, that's called error amplifier, right. Correct, yeah, I see that, I see that 16 here, they call that error amplifier and that's the same as what I just described.

Q. So Rincon-Mora does not describe box 16 as an operational amplifier, correct?

MR. LIU: Objection to form.

A. Again, in the context of describing the signal flow, you know, the feedback loop, it is error amplifiers.

It's just that, you know, their typical way of implementing these error amplifiers and that, you know, happens to be operational amplifier, so this a typical

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practice, right -- so that's what I have been, you know, offering my opinions and also in my report that, you know, people can easily understand that to be or choose this operational amplifier to implement this error.

Q. But you would agree with me that the Rincon-Mora reference itself does not say that box 16 is an operational amplifier and instead it calls it an error amplifier, correct?

A. Rincon-Mora, especially you showing this passage, you know, it does say that the functional-wise, it is error amplifier. So this one for sure. The operational amplifier, as I said, I do need to go back and read the reference again to see whether they specify somewhere. But I also mention in my report and just now that, you know, operational amplifier is a very common way to implement an error amplifier.

Q. All right. In your opinion, Dr. Chen, is the term "voltage buffer" a term of art?

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MR. LIU: Objection to form.

A. Voltage buffer is a way that, you know, yes, people would consider a voltage buffer, people would generally understand the characteristic of such a voltage buffer.

Q. And what is the definition that a POSITA would understand for the term "voltage buffer"?

A. So, counsel, I believe I have offered my opinions in my report. Give me a minute.

Yes, so I think we have to actually probably check this morning. So on page 26 of my report, where I describe here the voltage buffer typically refer to a buffer circuits with low impedence, low output impedence.

Q. What do you mean by low output impedence?

A. Low output impedence means that if you look at the output port of this particular buffer circuits, if you measure impedence of this buffer circuits, you will see that value relatively low. So if

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that's low, that's low impedence. If that's high, that's high impedence. So basically it's looking back to the circuits.

Q. Does the voltage buffer try to hold a value constant on its output?

MR. LIU: Objection to form.

A. Not necessarily. It depends on what's your input you give to the buffer, right. So buffer typically would just copy, right, the input to the output.

Q. What type of input would a voltage buffer have?

A. Again, that depends on the design scenario, you know, what input you give to this voltage buffer, right. It can be a constant signal, it can be a signal that, you know -- it really depends on the design situation.

Q. Could a voltage buffer have a current on its input?

MR. LIU: Objection to form.

A. You mean the voltage buffer?

Q. Yes.

A. Typically the voltage buffer in

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this case would use a voltage source to drive this. The reason is because the input is relatively high impedence and so when you use the voltage to drive this buffer circuits, you know, you will get the most signal out.

Q. Assuming you had a voltage on the input of a voltage buffer, would the output of the voltage buffer provide a proportional voltage output?

MR. LIU: Objection to form.

A. Yeah, so whatever that you apply to the input, yes. So the output, you know, would -- the signal would actually, you know, be a portion of the input as you mentioned. So if you get the unity gain, that mean that that portion is one.

Q. So in the unity gain example that you just suggested, in that scenario, if you had one volt on the input of the voltage buffer, the voltage buffer would try to maintain the output at one volt as well, correct?

MR. LIU: Objection to form.

A. So that depends on what kind of

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unit buffer you could actually implement, right. So yes, in some implementations, you would want the output to copy the input exactly. Sometimes, you know, the output/input voltage, they may be a little bit voltage drop. You know, again, depends how you implement it. But, in general, they will follow, right. So if you increase the input, the output will increase, so.

Q. And the goal of the voltage buffer is to try to maintain the same voltage on the output regardless of how much current is necessary to do that, correct?

MR. LIU: Objection to form.

A. It is not my understanding to understand how this buffer works. Again, as I mentioned, the voltage buffer, the output is a function of the input, right. So whether it comes to know or not really depends on what the input signal that you feed to the voltage buffer.

So the bottom line is I do need to see the context, you know, how this

Page 197

particular buffer is used in a particular circuit. That's where I can judge.

Q. Yeah, and I'm just talking a general example, here, right, so not any particular circuit.

But is it correct that the purpose or the goal of the voltage buffer is to supply a constant voltage on the output for a given voltage input even if it needs to source a lot or only a little current on the output to do so?

MR. LIU: Objection to form.

A. That's only in the case where your input to this voltage buffer is a constant voltage, right, or sometimes we call a DC voltage. Then the output would try to hold this constant.

Q. Does the '074 Patent use the term "voltage buffer"?

A. I don't recall -- you said it was the '074?

Q. Yes, in the '074.

A. Yeah, I need to, again, check the entire, you know, patent again. But sitting here right now, I don't recall that

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it would single out the voltage buffer.
But if you'd like, I do need to check again to confirm.
Q. How is a voltage buffer different from a current buffer?
MR. LIU: Objection to form.
A. So, counsel, I have offered my opinions again on page 26, you know, of my report. So generally speaking, the voltage buffer compared to current buffer, it provides basically lower output impedence.
Q. Does Al-Shyoukh disclose a current buffer?
MR. LIU: Objection to form.
A. I don't recall Al-Shyoukh -- again, I forgot, I need to double-check again basically the entire Al-Shyoukh for me to answer that question probably -- but I don't particularly recall that they call that as a current buffer. Instead, they may just call it buffer.
Q. Does Al-Shyoukh disclose a voltage buffer?
MR. LIU: Objection to form.
A. They reveal the buffer was low

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output impedence. And in the paper, for instance, Figure 1, they call it as buffer.
Q. And is low output impedence the characteristic of a voltage buffer or a current buffer?
A. Counsel, I'm reading my report again just to refresh my memory.
Yeah, so if you can please go to page 27. So in paragraph 55. So I think this is where to the extent I identify the characteristics of the Al-Shyoukh's buffer. In Al-Shyoukh's buffer, you know, the output impedence is actually low. Why? Because they would like to place the parasitic pole to be very high. So that's why I would, you know, regardless whether, you know, of what it's called, you know, it's current buffer or voltage buffer, you know, in this case they all show low output impedence.
Q. Is it your testimony that Al-Shyoukh discloses both a current buffer and a voltage buffer?
MR. LIU: Objection to form.
A. My testimony is just saying that,

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you know, the Al-Shyoukh, you know, buffer is, you know, the source follower circuit, as you can see in this schematic. I believe that's N21. It is a source follower. And that is the same as what I have seen in '074, which is also a source follower. So to me, they are the same.
So regardless what they call, you know, whether '074 call it current buffer or current buffer driver, you know, or Al-Shyoukh call it as a voltage buffer, to me they are the same because they all use the same type of circuit, you know, source follower, as we see here, they both have low output impedence. So to me they are the same buffer.
Q. And my question is a little bit different and let me try and ask it this way.
Assuming you had never read the '074 Patent before, would you say that Al-Shyoukh discloses a current buffer or a voltage buffer in the box you drew around M21 and M22?
MR. LIU: Objection to form.

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A. Sorry, the question is have I ever seen '074?
Q. Yeah, correct. Let me ask the question again.
If you had never read the '074 Patent, would you describe Al-Shyoukh transistor's M21 and M22 as discussing a current buffer or a voltage buffer?
MR. LIU: Objection to form.
A. Because Al-Shyoukh actually himself in the paper called it as a buffer, so I would just understand this is a buffer. And because they show this as a source follower, I will understand that, you know, because the source follower generally show a low output impedence, so this is something that a POSITA typically would understand that, you know, towards more a voltage buffer.
But the bottom line really is that, you know, I do need to see the actual, you know, circuitry schematic, in this case source follower, for me to make that judgment.
Q. Do you rely on any reference

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other than Al-Shyoukh to satisfy the current buffer limitation?
A. So counsel, are you referring to this Claim 1B?
Q. Yes.
A. Right. Yes, so in this particular claim, that's Al-Shyoukh reference that I use.
Q. Are you modifying Al-Shyoukh in any way to satisfy the claim -- strike that.
Are you modifying Al-Shyoukh in any way to satisfy the current buffer limitation of Claim Element 1B?
A. No. They are the same source follower circuit as I repeat in the report and also my testimony. Yeah, so I don't believe any modification is required.
Q. You say in paragraph 54, the first sentence: I note that the '074 Patent does not actually seem to describe or disclose a current buffer driver in its description of the supposed invention. Correct?
A. Correct, that's the language I

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put here.
Q. And you go on to explain that, in fact, you think the '074 Patent only describes a voltage buffer, correct?
A. No. All I said is, as you can see from paragraph 54, 55, I only offer what a POSITA would consider, you know, as a buffer circuits.
And the conclusion will be what I provide in paragraph 55, regardless of what they called, you know, current buffer driver or voltage drivers, to me they basically reveal the same driver, buffer, right. So it is my view that I've concluded in this paragraph 55 and also 54.
Q. And your opinion is that what the '074 Patent calls a current buffer is something a POSITA would have recognized as a voltage buffer, correct?
A. So what I meant here is that, as I described already in the following sentence, right, of 54, that was mainly focusing on the output impedence as we described a few times. The low output impedence, that's usually what, you know, a

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POSITA would recognize as a voltage buffer.
But as I conclude, it doesn't matter, you know, how we would refer to the name. They both showed low output impedence. So to me they are the same.
Q. And what I want to know is do you stand by your testimony that what the '074 Patent calls a current buffer is something a POSITA would have recognized as a voltage buffer?
MR. LIU: Objection to form.
A. Counsel, I'm not sure of your question. You know, as I said, I thought my explanation here in my report is very clear.
It is something that POSITA may recognize as a voltage buffer in the view of the output impedence. Because they have low output impedence, because they are both source followers, then the POSITA would consider, and it's also my opinion, that it would be considered as the same buffer circuits.
Q. Well, you use the word "may" in your answer this time around. So I want to

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know, is it your testimony, Dr. Chen, as you state in your report, that what the '074 Patent calls a current buffer is something a POSITA would have recognized as a voltage buffer?
A. Yes.
Q. Okay. You're not changing your testimony?
A. No, I'm not changing my testimony.
Q. Okay.
A. I stick to my report.
MR. LIU: We've been going a little over an hour, I think. So next convenient point for a break would be great.
Q. In paragraphs 142 to 144 of your report, you talk about the current buffer limitation for the Rincon-Mora reference, correct?
A. Counsel, are you referring to paragraph 144?
Q. 142 to 144.
A. 142. Yes, 142 to 144 is Rincon-Mora.

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Q. Do you rely on any other prior art reference besides Rincon-Mora for the current buffer limitation of Element 1B?
A. No, here it's just Rincon-Mora.
Q. Do you rely on modifying Rincon-Mora in any way to satisfy the current buffer limitation of Element 1B?
A. No. So Rincon-Mora also shows the source follower type of buffer circuits, which is the same as '074. So they all use the same buffer circuitry.
Q. If you had never read the '074 Patent, would you agree with me -- well, strike that.
Would a POSITA who had not read the '074 Patent conclude that Rincon-Mora disclose as current buffer?
MR. LIU: Objection to form.
A. Counsel, so on page 77, paragraph 143, I think that's the same argument as in Al-Shyoukh case. POSITA would have recognized that as a voltage buffer.
Q. Okay. In paragraph 142 of your report, do you identify the transistor 42 as the claimed current buffer?

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A. Yeah, so that's the buffer circle in 42.
MR. JENSEN: Let's go off the record.
THE VIDEOGRAPHER: The time is 3:40 p.m. and we're going off the record.
(Recess taken from 3:40 p.m. to 3:50 p.m. PT)
THE VIDEOGRAPHER: The time is 3:50 p.m. and we are back on the record.
BY MR. JENSEN:
Q. Dr. Chen, before the break we were talking about the current buffer driver limitation and we were looking at paragraph 142 of your report where you include Figure 3 of the Rincon-Mora reference, correct?
A. Correct.
Q. And you identify the current buffer as the buffer driver in green, which is transistor 42, correct?
A. So I'm reading my 142 as the buffer driver that we show green.

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Q. And there's also a box here that's labeled 40 which you colored in blue.
Do you see that?
A. Yes, I see there's a box colored blue and it's 40.
Q. In your opinion, is the circuitry in box number 40 part of the current buffer driver?
A. The 40 is the one that I highlight in blue, that includes the current system and the functionality of that is to provide the current to the buffer circuits, which is 42.
So to that extent, that 40, you know, provides the functionality to the buffer driver.
Q. Yes. I'm just trying to understand what is it you point to as the current buffer driver in Rincon-Mora Figure 3? Can you identify all the transistors that you say comprise the current buffer driver?
A. For the buffer driver here, as I mention in my report, that is the 42. And

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the circuitry on the bottom, which is marked by 40 that provide the bias to it. That's the way I see this circuit composition.
Q. In your opinion, is the circuitry in box 40 part of the current buffer driver or not?
A. No.
Q. Okay. Let's go to paragraph 203 of your report. This is where you provide your analysis for Claim 16 in connection with Rincon-Mora, correct?
A. 203 is Claim 16 of Rincon-Mora, yes.
Q. And what does Claim 16 require?
MR. LIU: Objection to form.
A. So as mentioned in Claim 16, you know, it would further comprise the capacitors, you know, biasing circuits for improvement.
Q. Does Rincon-Mora disclose the claimed capacitors of Claim 16?
A. Rincon-Mora does not really show the specific design for the biasing circuitry. So I was not able to make that

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judgment whether they actually put the capacitor inside that biasing circuitry. And that's exactly what I point out also in my report, you know, starting paragraph 203.

Q. And you're referring to the language here where you say Rincon-Mora does not provide a specific design for its own biasing circuit?

A. That is correct.

Q. And if we look at Rincon-Mora Figure 3, are you able to see that on the screen?

A. Yes, I can see that.

Q. And so you're saying Rincon-Mora Figure 3 does not show the claimed capacitors required by Claim 16?

A. What I was saying is that, as you can see here, you see that symbol with arrow facing down, the I-Bias circuits? Counsel, do you see that?

Q. Yes.

A. So that's the biasing which usually POSITA understand as the biasing circuitry. Rincon-Mora does not show the

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detail of this biasing circuitry. So I was not able to even, you know, judge whether there's a capacity inside that device circuitry. And that's why I provide my analysis starting from 203, 204, 205 and 206.

Q. And you bring up a good point, so maybe I should ask about that.

Claim 16 says that the capacitors have to be in the biasing circuit, correct?

A. That is correct.

Q. And if we go back to Rincon-Mora Figure 3, where is the claimed bias circuit?

MR. LIU: Objection to form.

A. So the biasing circuitry can go at different parts of the circuits, right. But the one that you highlight blue, I would consider that as part of the biasing circuitry.

Q. And you're referring to what's labeled as I-Bias in Rincon-Mora Figure 3 as the biasing circuitry?

A. I consider that as part of the biasing circuitry, yes.

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Q. Okay. You said part of the biasing circuitry. What -- let me ask the question this way, what is the claimed bias circuit in Rincon-Mora Figure 3?

MR. LIU: Objection to form.

A. So, in general, when we operate the circuits, you do need certain bias voltages or current.

In the example that you're seeing here, this is what we called as a biasing current. The reason I say that is, you know, for instance, inside your lot number 16 -- this amplifiers, this is what we discussed earlier -- inside that you may also need some biasing circuitry to bias a circuit in that portion. And hence, that's why I say that, you know, I expect -- I will expect that, you know, the blue box here will be part of the biasing circuitry.

Q. Let's look at Exhibit 2013, which is the language of Claim 1.

And you'd agree with me that Claim Element 1C requires a biasing circuit coupled to the current buffer driver to set a biasing ratio for gm-boost of the current

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buffer driver, correct?

A. That is correct.

Q. What do you identify, if anything, in Rincon-Mora Figure 3 as the claimed biasing circuit that is recited in Claim Element 1C?

A. So that would be the blue box that you highlight earlier. Because you can see that bias current eventually will be coupled to the buffer driver 42. Yes.

Q. Okay. So I've placed a blue box around the I-Bias that you referenced, correct?

A. Correct.

Q. And is the I-Bias in the blue box what you identify as being the claimed biasing circuitry in Element 1C?

A. Counsel, if you don't mind, can you please show me the 1C again?

Yes, the bias is coupled to the current buffer driver, correct.

Q. Give me just a moment here.

A. In fact, you know, in my reports, paragraph 145, you know, outlines what I have just described.

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MR. JENSEN: I'd like to introduce another exhibit, I'll drop it in the chat, which is Exhibit 2014, which is the annotated version of Rincon-Mora Figure 3 where Dr. Chen identified the claimed biasing circuit.

(Exhibit 2014, Rincon-Mora Figure 3, was remotely introduced.)

BY MR. JENSEN:

Q. Let's look at Al-Shyoukh now. And you rely on Al-Shyoukh Figure 8 for your analysis, correct?

MR. LIU: Objection to form.

A. Sorry, counsel, can you please repeat the question?

Q. Sure.

Do you rely on Al-Shyoukh Figure 8 for your invalidity analysis?

A. Can you point out which particular analysis in my report?

Q. Yeah, let's go to the same current buffer limitation that we've been talking about.

A. Okay.

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Q. And that, I believe, is at paragraph -- I'm sorry, not current buffer, the biasing circuit -- and I believe that's at paragraph 56 of your report.

A. I'm at paragraph 56 of my report.

Q. And in that paragraph you include an annotated version of Al-Shyoukh Figure 8, correct?

A. Correct.

Q. What transistors, if any, do you identify in Al-Shyoukh as the claimed biasing circuit of Claim Element 1C?

MR. LIU: Objection to form.

A. So as I point out in my report, the biasing current, which is shown in blue. You see the blue highlighted H?

So that's a biasing current that's coming from. So you will see that until in transistor M27 as well as that Vb1 at the gate of M27.

Q. Is Vb1 a transistor?

A. No, Vb1 is the voltage that come into this transistor.

Q. So my question is, what transistors are you identifying as the biasing circuit in Al-Shyoukh Figure 8?

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MR. LIU: Objection to form.

A. So that would entail M27 as well as whatever that circuitry would generate, the Vb1. And I believe that's exactly what I show on page 28 of my report. I say that the voltage Vb1 at the gate of M27 is provided by biasing circuits. So basically there would be biasing circuitry that would generate, that would create this bias voltage that would feed to this M27.

Q. Is the claimed biasing circuitry that would generate the Vb1 voltage located external to the regulator?

MR. LIU: Objection to form.

A. I'm not sure the definition of external. It can be nearby. It can be at some central location where you create this voltage. But the bottom line is that I expect there will be additional circuitry, biasing circuitry, that would create this signal, voltage signal Vb1.

Q. And that's not shown in Figure 8, correct? Did you give an answer? Maybe I didn't hear the question?

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A. I believe I said correct. Did you --

Q. Let me just ask the question again so we have it, so we have it straight.

Is the claimed biasing circuitry that you rely on for Al-Shyoukh Figure 8 shown in Figure 8 itself?

A. Yeah, and the answer is that, you know, it would entail additional circuits that is not shown in Figure 8 to create that voltage signal Vb1. And because the VB would come into M27 and that would create a biasing current at 22, flowing to the rest of the circuit.

Q. And just to make sure I understand, are you saying that transistor M27, which is shown in Figure 8, is part of the claimed biasing circuitry?

A. Yeah, because it's part of the circuits that would create that biasing current. Yeah, so you can interpret that as part of the biasing circuitries.

Q. Are there any other transistors shown in Figure 8 that are part of the

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claimed biasing circuitry?
A. There's another one next to it. You see there's a VB2? So they work in similar fashions. They could potentially -- they can actually provide another biasing voltage and current over there.
Q. So you've identified transistors at M26 and M27, correct?
A. In the context of Claim 1C here, you know, as what I show in my report, that's M27 and Vb1, right.
I thought the question you asked me earlier is that you said any other parts of the circuit may require another biasing circuit and that's where I identify as VB2.
Q. Yeah, so let me reask the question, and thank you for that clarification.
With respect to the claimed biasing circuitry in Element 1C, what do you identify in Al-Shyoukh Figure 8 for that limitation?
A. In the mapping that I offered in 56 -- in 56, you can see that's where I

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highlight Vb1 and 27. However, if you go further down, there's another interpretation, you know, paragraph 59. And also the following figures that I show there.
So those where you can see in my report, you know, the biasing circuits in that case, you know, provides the voltage Vb1 for the M27, VB2 for M26, and that would be all part of this biasing circuitry of Claim 1C.
Q. I'm not sure I understood that. Let me ask, how many different interpretations of biasing circuitry are you giving opinions for?
MR. LIU: Objection to form.
A. So there are two explanations for here, mainly for the biasing ratio. If you can see in my report, so there are two potential way of, you know, interpreting this, quote-unquote, biasing ratio in this claim language. And one is what we have been discussing that's on paragraph 56, 57 where the biasing ratio, you know, is referred to in 22 and 23 and that's where I

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identify those biasing, you know, currents coming from Vb1 and 27.
Alternatively, you know, if you can please go to paragraph 59. So I was told that the Patent Owner argued the biasing ratio should be understood as the ratio between the DC current to the current feedback circuits, and that's where the second interpretation that I was referring to.
So if you can look at paragraph 59, Al-Shyoukh's biasing circuits provides voltage Vb1 at transistor M27, and Vb2 at transistor M26.
So to that extent, that's why I referred, I draw your attention, you know, to this Vb1, Vb2 circuits.
Q. So under one interpretation, your opinion is that M27 and the circuitry that provides the Vb1 voltage is the biasing circuitry.
And under a second interpretation, your opinion is that M26 and M27, along with the circuitry that generates Vb1 and Vb2 is the claimed

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biasing circuit?
MR. LIU: Objection to form.
A. Under the context of each interpretation, I identified the portion of the circuits that actually provide the biasing circuitry. So yes, so under two individual contexts, those are the two part of the circuit I identify as the biasing circuitry.
Q. So let me see if I can just summarize this now. And the reason why I'm asking this is if we look at, for example, Claim Element 1B, you drew boxes around the circuits that you identified as the current buffer.
You drew -- and that's in green. And you drew a box, a yellow box around what you identified as the op amp. And I think in those instances it's more clear what it is you are identifying for the claim limitation?
When I get to Claim Element 1C, which requires a biasing circuit, I didn't see any boxes drawn around any transistors.
And so that's why I'm asking the

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question and I'm trying to understand and give you an opportunity to clarify, you know, what it is that you intended to identify as the biasing circuit.

So with that as context, let me ask sort of the question again.

Under the first interpretation that you offer, what transistors do you map to the biasing circuit in Al-Shyoukh Figure 8?

A. Again, in the first interpretation, right, the biasing circuits is consists of Vb1 because that drive the gate of M27. So that's where we identify, you know, as that biasing circuits.

In fact, I think I did provide that in my report. That would be in paragraph 56.

Q. And under that interpretation, are you saying that transistor M27 is also part of the biasing circuit?

A. The bias voltage come to that particular transistors. So a POSITA could understand that as also part of the biasing circuits, that is correct. And that's, you

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know, because the figure unfortunately they do not show how the generate Vb1, right.

So that could be why I could not circle a box to show you what transistors. So instead, you know, I have to use the text to say that, which is in paragraph 56, right, so you can see that voltage Vb1.

Q. So you're saying under your first interpretation that the biasing circuit that generates the bias voltage for Vb1 is not shown and that's why you couldn't circle it?

MR. LIU: Objection to form.

A. I couldn't circle that transistor because to address your question that you just asked me, right. But I believe in my report, I think it's clear that, you know, whatever that circuit generate Vb1, right, that should be applied in same circuits because as I said it's provided by biasing circuits. So it's just unfortunately they don't show, they don't show the details of that.

Q. And under your second interpretation, what in Al-Shyoukh Figure 8

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do you map to the claimed biasing circuit?

A. So that would be on page 30 of my report, paragraph 59. If you can please look at the bottom three lines, Al-Shyoukh's biasing circuits provides biasing voltages Vb1 at transistor M27 and Vb2 at transistor M26.

Q. And would your answer be the same as before with respect to not being able to circle the circuitry for Vb1 and Vb2 because neither biasing circuits are shown in the figure?

A. That is correct.

Q. Okay.

A. That is correct.

Q. And Al-Shyoukh Figure 8, you highlighted certain nodes or wires with colors, correct?

A. That is correct.

Q. And you're not saying that those wires are the biasing circuit, correct?

A. Correct, no, no.

Q. Let's look at Claim Element 1D. And I'm sharing Exhibit 2013, which is Claim 1. Could you just read allowed,

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please, Dr. Chen, Claim Element 1D?

A. Sure. Claim 1B: An enable/disable function to enable/disable the biasing circuit for reducing standby current.

Q. You would agree with me that either Rincon-Mora nor Al-Shyoukh discloses Element 1D, correct?

A. Rincon-Mora and --

MR. LIU: Objection to form.

A. To the extent that they show, I cannot see, even see the biasing circuits. So there's -- unfortunately I cannot, you know, make that judgment. I don't see that, you know, based on the information you provide.

Q. And that's why you combine those references with the Ivanov reference, isn't it?

A. That is correct.

Q. Let's go to paragraph 150 of your report. This is where you talk about the enable/disable function of Element 1D for the Rincon-Mora ground?

A. Yes, it is.

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Q. And in paragraph 150, you say: Rincon-Mora does not describe the design of its own biasing circuit.
Correct?
A. Correct. So that bias circuitry Rincon-Mora does not reveal the circuitry.
Q. And from there you go on to discuss the Ivanov reference in the following paragraphs, correct?
A. Correct.
Q. I can't remember if we've already introduced the Ivanov reference, but if not, I'll do it now.
A. I don't recall we have, but I'll leave that to you.
MR. JENSEN: Let me introduce Ivanov, which is Exhibit 1005.
(Exhibit 1005, U.S. Patent No. 6,400,907, remotely introduced and provided electronically to the reporter, as of this date.)
BY MR. JENSEN:
Q. And before I ask you about that, let me direct your attention back to Al-Shyoukh Exhibit 1004 for just a moment.

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And I've placed a blue box in Al-Shyoukh Figure 8 around transistor M27 and the node Vb1.
Do you see that?
A. I see that.
Q. And did I correctly identify there what you point to under your first interpretation in Al-Shyoukh for the biasing circuit of Element 1C?
MR. LIU: Objection to form.
A. I wouldn't circle this way for the reason I already mentioned. Because in this Figure 8, they simply do not show the circuit that generate Vb1.
So the way I read -- so the way that we -- so the way that you mark like this, you know, it may cause confusion later on. And that's why we put in the text.
Q. And with that understanding that there would be additional circuitry in the blue box to generated Vb1, did I correctly identify what you point to as the biasing circuit in Al-Shyoukh?
MR. LIU: Objection to form.

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A. For the first interpretation of the Al-Shyoukh.
Q. Yes, for the first interpretation. Correct?
A. Yep.
Q. Okay.
A. Yes.
MR. JENSEN: Let me introduce into the chat Exhibit 2015, which is the annotated version of Al-Shyoukh Figure 8 that we were just discussing in connection with the biasing circuit limitation.
(Exhibit 2015, Al-Shyoukh Figure 8, was remotely introduced.)
BY MR. JENSEN:
Q. All right. Turning back now to Ivanov, Exhibit 1005, first off, Dr. Chen, do you recognize Exhibit 1005 as the Ivanov prior art reference that you discuss in your report?
A. Yes, I recognize.
Q. And for what purpose do you rely on the Ivanov reference?
MR. LIU: Objection to form.

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A. So as I point out in my report, Ivanov circuit -- sorry, Ivanov paper or sorry, patent, shows the biasing circuits with enable/disable circuit.
Q. Do you rely on Ivanov to provide the biasing circuit of Element 1C that we've been discussing?
A. No. It doesn't need to be. It's mostly focusing on the enable/disable circuits.
Q. And what is shown in Ivanov Figure 1?
MR. LIU: Objection to form.
A. So I point out in my report, this Figure 1 of the Ivanov that basically shows the biasing circuitry with the enable/disable signals, specifically with respect to V shutdown signal, as you can see in this figure.
Q. What transistors, if any, from Ivanov Figure 1 are you combining with Rincon-Mora to satisfy Element 1D?
MR. LIU: Objection to form.
A. Because Rincon-Mora does not show the biasing circuits as we just described.

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So rather what I show here is to show that, you know, the functionality that can be provided by this enable/disable signal and how that can shut down or disable the biasing circuits.

Q. Which transistors in Figure 1 are you relying on for that purpose?

A. So I think in my report, I describe how that can function. I think it may be from paragraph 153 and onwards.

So basically you will see the transistor M11, which is connected to V shutdown. That's where you would control the biasing circuitry to turn on and turn off.

Q. Is transistor M11 the only transistor that you're combining from Ivanov with Rincon-Mora?

A. Again, Rincon-Mora does not show the biasing circuitry. So all I show here is just to show how enable and disable biasing circuitry can look like.

Q. So in paragraph 153 of your report, you include Figure 1 from the Ivanov reference, correct?

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A. That is correct, counsel.

Q. And so I'm trying to understand, because you show the entirety of Ivanov Figure 1, are you combining all of Ivanov Figure 1 with Rincon-Mora or just a certain part of Figure 1?

A. All I'm showing here is really just to show the enable and disable function of circuits -- sorry, function, you know, for the biasing circuitry. So that's the extent that I use, you know, for the purpose of this.

And the reasons, as I mentioned before, Rincon-Mora does not show the biasing circuits details rather than just showing the symbol and that's why here I mainly show Ivanov, you know, how they can use that transistors in 11 and that shot down circuits to perform the enable and disable function.

Q. And that's why I'm asking the question, Dr. Chen, is precisely because you did not show a biasing circuit for Claim Element 1C. I'm trying to understand what your opinion is that you would combine

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from Ivanov Figure 1 with a circuit that is not shown. And it's not clear to me what part or parts of Ivanov Figure 1 you are combining with Rincon-Mora.

And so I wanted to give you a chance to clarify and identify specifically what is it in Figure 1 that you are combining with Rincon-Mora?

MR. LIU: I'm sorry. I'll object to the form of the question.

A. So, for instance, you see on the top right, there is an I-Bias provided by Ivanov, right? Then that's -- in Rincon-Mora, you remember that the I-Bias current, art row is pointing down, on the top to down? I don't know if you remember.

That's, for example -- you could actually use that current to basically supply the Rincon-Mora circuits. But that can be one embodiment to inject into Rincon-Mora circuits. So I hope that clarifies.

Q. I'm not sure that it did because I had understood you to say before that you're not relying on the Ivanov reference

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for the bias circuit.

Again, I'm trying to understand what is it from Figure 1 that you are combining from Rincon-Mora to satisfy the enable/disable limitation?

A. So I did point out in, for example, page 87, paragraph 158 -- do you see that? Paragraph 158.

So this is exactly what I mentioned earlier. You could actually use that Ivanov providing that biasing current to basically to the extent of generating, you know, you know, that I-Bias circuitry that we saw earlier in Rincon-Mora. You can just, you know, use that way.

But as I mentioned before, there are many ways to generate, to creating the biasing circuits, so it's not really limited to just Ivanov. So that's, you know, to the extent that how I would use this, you know, for the Rincon-Mora circuits. So it's all provided in this paragraph 158.

Q. So are you combining Ivanov as a bias circuit with Rincon-Mora or not?

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A. This is one way of using that. You know, I'm not suggesting that this is the only way to use Ivanov biasing circuit for the Rincon-Mora, right.

So I could, you know, deal with another bias circuitry and with the enable and disable signal function and I still can equally find to apply -- supply for the Rincon-Mora circuits.

Q. But you didn't show any other example bias circuit in your report, did you?

A. I did not. Because the key here is really just to show that a biasing circuits with enable and disable is common practice. So that's to the extent I would like to show this my report.

Q. So in paragraph 158 when you refer to Ivanov's bias circuit, what is Ivanov's bias circuit in Figure 1?

A. So they, pretty much everything that you see here are the biasing circuits in Ivanov, right. And then that example that we show, I hinted to you on the top right, you can see that, you know, in this

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Ivanov circuits, he actually used this current bias. I think it's called I-Bias plus -- the font is small, but if you can read -- this currently would inject to the open, right.

So basically this shows how, Figure 1 shows how the biasing circuit could generate that bias current for that open circuit.

So this is to the extent that Figure 1 shows by Ivanov.

Q. So if you are combining Ivanov's bias circuit with Rincon-Mora, you would combine the entirety of what's shown in Figure 1?

A. Fortunately, right, because here I don't need the open, right. So remember the circuit that we saw, there's an arrow point down, the I-Bias?

And, in fact, you know, I point out again paragraph 158, I have suggest that, you know, one potential way is actually use the I-Bias, you know, class to create whatever that desired value of I-Bias that Rincon-Mora may require.

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Q. So you would combine everything in Ivanov Figure 1 except the op amp 18 with Rincon-Mora, is that correct?

MR. LIU: Objection to form.

A. That, I need to go into more details analysis. There might be some portion of the circuit I can further remove because in this case Rincon-Mora just need one bias current. So the circuit may be further simplified.

But as I point out in the report, you could borrow the Ivanov circuits and take the portion up to the I-Bias plus and then you can use that to supply that Rincon-Mora -- value of the bias current -- sorry, a caveat.

Q. You didn't perform an analysis in your report where you took just a portion of Ivanov Figure 1 and combined it with Rincon-Mora, correct?

MR. LIU: Objection to form.

A. I did not provide further analysis other than what I said in 158. But as I mentioned earlier, any further optimization is always possible to further

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optimize the circuits.

Q. Is your analysis relating to Ivanov the same for both Al-Shyoukh and Rincon-Mora?

A. Let me check.

Counsel, if you can please go to page 36, paragraph 68. Here, as you can see, I provide my analysis of how you may use Ivanov biasing circuits in the context of Al-Shyoukh.

Q. Yeah, and is there anything different about that analysis in paragraph 68 and the following paragraphs from the Rincon-Mora analysis that we just looked at?

A. Yeah, so the circuits -- because the circuits, you know, of Al-Shyoukh are schematic and Rincon-Mora are slightly different, right. So as you can see from my report, the M22 of the Ivanov, you know, you could map to M27 of the Al-Shyoukh, as an example, right. I think we just described this a few minutes ago, back in 27 and that Vb1. Remember that Vb1 circuitry that we just talk about, right?

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Q. Correct.
A. So that's potentially where you can, you know, use that in that locations, you know, to use that to generate at that bias current flowing down to provide the biasing circuits for the Al-Shyoukh.
Q. Apart from the difference that you just noted, is your Ivanov analysis any different between Al-Shyoukh and Rincon-Mora?
A. They are similar. So they basically provide the biasing current, right, or biasing voltage, and the key is still that you can enable and disable this bias.
Q. Let's go back to Ivanov, and you mentioned before that one of the things that you were taking from Ivanov was the V shutdown signal on node 8, correct?
A. That is correct.
Q. Does the V shutdown signal in Ivanov Figure 1 connect to anything in Al-Shyoukh Figure 8?
A. What's the question, where is the V shutdown signal in Figure 8?

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Q. Do you see in Ivanov Figure 1 you reference the V shutdown on node 8, correct?
A. Correct.
Q. Okay. And as part of your combination of Ivanov and Al-Shyoukh, are you connecting the V shutdown signal to any part of the Al-Shyoukh circuit shown in Figure 8?
A. No. The V shutdown does not connect directly to the circuit that you have seen in Figure 8 of Al-Shyoukh.
But rather, you know, as I point out in that paragraph -- was it 68 -- so basically remember that portion of the Vb1 was not shown at all in Al-Shyoukh -- yeah, so that's where you can place this Ivanov biasing circuits, you know, and V shutdown will be part of that circuit, basically a part of that circuit.
Q. In the combined embodiment of Al-Shyoukh and Ivanov, how would the voltage regulator know when to assert the V shutdown signal?
MR. LIU: Objection to form.

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A. I'm not sure if I understand the question. How would a regulator know the V shutdown? Yeah, sorry, counsel, I don't comprehend the questions. Because, to me, V shutdown is a control signal, right. So how would it know no potential signal. So I have a hard time to understand the question.
Q. Let me adopt your verbiage of control signal. You characterized the V shutdown signal as a control signal, correct?
A. Correct.
Q. How would the system that used the combined embodiment of Ivanov and Al-Shyoukh know when to assert the V shutdown control signal?
MR. LIU: Objection to form.
A. So, counsel, I believe I did not perform the system analysis in order to determine when the systems should shut down or not shut down particular regulators. It's not in my analysis. So I'm not able to provide that answer sitting here today.
Q. Okay.

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MR. LIU: In fact, could we take another break?
MR. JENSEN: Let's go off the record.
THE VIDEOGRAPHER: Okay. The time is 4:47 p.m. and we are going off the record.
(Recess taken from 4:47 p.m. to 4:59 p.m. PT)
THE VIDEOGRAPHER: The time is 4:59 p.m. and we are back on the record.
BY MR. JENSEN:
Q. Welcome back, Dr. Chen.
A. Thank you.
Q. Let me direct your attention to Exhibit 2013, Claim 1 of the '074 Patent.
I want to go back to Claim Element 1C.
Do you see that?
A. Yes, Claim 1C, yep, I see that.
Q. And Claim 1C refers to a bias ratio for gm enhancement of the current buffer driver, correct?
MR. LIU: Objection to form.

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A. Correct.
Q. Do you have an understanding of the term "biasing ratio" as used in Claim 1?
A. Counsel, I believe we touch upon that already a little bit in Claim 1C, there are interpretations that I've done. Let me just take a look so I can point that to you.
So, for instance, if, let's say, we take the Al-Shyoukh as an example, and then if you can please go to page 28 of my report, paragraph 56.
So you see that, you know, at the end of that paragraph 56, you know, I mention that the figure shown above showed the feedback current from M25 in red, and the summed current further flowed down to M23, and then it will be mirrored to M22.
So by mirroring that, you know, it is one form of having the current ration or biasing ratio because M22 and M23 is what a POSITA would call that as a ratio.
Q. So let me ask a more basic question, what is a ratio?

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A. If you have two signals A and B and, you know, you provide certain data in B, the ratio between A and B, that's the ratio.
Q. Is it fair to say that it's a comparison of two things?
MR. LIU: Object to form.
A. Yeah, I'm not sure comparison is the right word for that. But basically it's the relative, you know, relative proportion, right. Because you do divide. So it's relative, you know, between the two.
Q. Is it a quotient of the two values?
A. Correct.
MR. LIU: Objection to form.
A. Yes, you can say it's a quotient between the two values.
Q. If quotient is a better term in your view then comparison, then I'll adopt the term quotient of two values.
A. Okay.
Q. What two values are being used to determine the biasing ratio in Claim Element 1C?

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MR. LIU: Objection to form.
A. From what I read on Claim 1C, it just point out to the ratio, and that I also offer it in paragraph 57.
Q. Let me ask the question this way. In Claim Element 1C, the claim biasing ratio is a ratio of what to what?
MR. LIU: Objection to form.
A. So this is what I provided in my analysis, right. So if you can please look at paragraph 57.
So here I actually provide an example, right, in the context of '074, do you see this Figure 3B with my annotations on page 29?
So if you read the text that I provide above these figures, the patent described the biasing network fixed by transistor 396, such that the current from the bias network is ratio in transistors 368 and 370.
So in this particular case, right, as I point out in my report, it's a ratio of the quotient of the current

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flowing through 368 and the current through 370.
Q. And that's in the '074 Patent you're talking about, right?
A. Correct, which I annotate in Figure 3B at the bottom of that paragraph 57.
Q. So tell me if I've got this correct. It's your opinion that in the '074 Patent, the claimed biasing ratio is the quotient of the current through 368 and 370?
MR. LIU: Object to form.
A. That is for my first interpretation, yes.
Q. Do you have another interpretation?
A. Yes. As I mentioned earlier, if you can please go to page 30, paragraph 59.
So I was told that Patent Owner also argues that biasing ratio should be understood to mean a ratio of the current that the current buffer draws from the DC relative to the current feedback circuit.
So that would be my second

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interpretation as I show in my report regarding this ratio.

And, in fact, if you can please further go down to the next page 31, you see that the figure that annotate with different colors, so that's basically how I show -- because the ratio between the DC bias current which is shown in blue and the current feedback which is shown in red, so the ratio between those two, or the quotient, whatever that term that you earlier used, will be referring to those, in the context of this second application.

Q. And in Al-Shyoukh, under your first interpretation, what two currents are setting the claimed biasing ratio?

A. So that would be -- so if you can please go to page 28. So this is Al-Shyoukh. If you can please pay attention to transistor M22, M23, that's the current that I was describing earlier.

That's where you can consider, you know, in my first interpretation as the current ratio, you know. And that will be, you know, equivalent to what I show in page

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29, that current mirror transistor, as I mentioned earlier, 368, 370, that's the current mirror that we see in '074. So that's the counterpart of that current ratio.

Q. So in paragraph 56 of your report you have an annotated of Al-Shyoukh Figure 8, correct?

A. Yes, above the -- yeah, within the paragraph 56, yes, I have annotated the Al-Shyoukh schematic.

Q. And you highlighted in red, blue and purple three different currents, correct?

MR. LIU: Objection to form.

A. So the red, blue and purple is just to show the signal path, right, those wires and the current associate with that wire is what I'm trying to annotate by colors.

Q. And which two currents in Al-Shyoukh Figure 8 set the claimed biasing ratio under your first interpretation?

A. Counsel, that's what I mentioned earlier. In the first interpretation, the

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transistor M23, M22, now we're determining the current ratio.

Q. And those are the two transistors that form the current mirror?

A. That is correct.

Q. Let's go back to Exhibit 2013, which is Claim 1 of the '074 Patent. And I want to look at Claim Element 1C and 1D.

Claim Element 1C refers to gm-boost of the current buffer driver, correct?

A. 1C, yes, a biasing ratio for gm-boost of the current buffer driver, correct.

Q. And then Claim Element 1B refers to a gm enhanced current buffer driver, correct?

A. Correct, 1B is a gm enhanced current buffer driver.

Q. In your opinion, Dr. Chen, are gm-boost and gm enhancement in Claim Elements 1B and 1C the same thing?

MR. LIU: Objection to form.

A. So, counsel, if you can please go to page 25 of my report. So paragraph 53,

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right under Claim 1B, you know, I offer my opinions. And, in fact, I explained briefly also in the summary of Al-Shyoukh basically the current feedback, you know, circuits, you know, with the enhanced gm of the transistors, and that's how I interpret gm enhanced.

Q. Yeah, and my question is a little bit different, which is simply looking at Claim 1 are gm enhancement and gm-boost the same thing or are they different?

MR. LIU: Objection to form.

A. Sitting here, I don't recall that the '074 actually defined gm enhanced or gm-boost separately. But it's my understanding that I show in the report because you do the gm-boost, you increase the current, you know, particularly to the transistor M21, and hence you increase the gm. That's how I understand this enhanced -- or sorry, the gm enhanced buffer.

Q. And how do you understand the gm-boost of the current buffer driver?

MR. LIU: Objection to form.

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A. So the gm-boost, I don't recall the details, but I recall '074 would describe the passage that related to that circuits to have the gm-boost. And I'm just trying to check the '074 Patent to see whether I can identify where that shows the current -- sorry, the gm-boost.

Sorry, counsel, on page 30, paragraph -- around paragraph 58. So here I provide my understanding of the gm-boost. Basically it includes the current for that buffer driver in the context of '074, that would be transistor 384. So that would be the sentence that you can see right above paragraph 58.

And in the context of Al-Shyoukh, we can further read paragraph 58. You can see that M22 will supply the current, which is a sum of the bias current and that feedback current, and therefore you increase the current that M21 will receive.

And because the current increase for transistors, that's why your gm increase, and that's how you receive the gm-boost.

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And, in fact, you know, in my overview section, I have offered my analysis, you know, to show why increasing the current would increase the gm of the transistors. So I think that should be on page 12 and page 13 of my report.

So that's how I establish this gm-boost, you know, through this analysis.

Q. How is the claim gm-boost different from the claim gm enhancement?

A. As I mentioned exactly on page 25, you -- because you have this feedback circuits, you have gm-boost, right, and as a result you increase the current for that for the buffer transistors. So you enhance that gm and that's how I understand a gm enhanced.

So you almost think that as outcome of that gm-boost.

Q. And in Al-Shyoukh Figure 8 which transistors perform the claimed gm enhancement?

MR. LIU: Objection to form.

A. So, counsel, if you can please go to page 31 of my report -- or actually you might want to stop on page 30 towards the end.

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Q. Okay. Go ahead.

A. Sorry, yeah. So as I describe here, you see the current I 22 and I 21, which is basically labeled in blue, right, in these figures, they will add to the feedback currents coming from M25, M24, what's shown in red. So those two current. It was summed. Because you summed the current, you increase the current, right. And that current will eventually, you know, provide the gm-boost to the buffer driver at M21. So that's --

Q. My question was not about gm-boost. It was about gm enhancement.

What transistor in Al-Shyoukh Figure 8 performs gm enhancement?

A. So counsel, as I mentioned before, the way I understand the gm enhance is the outcome of the gm-boost because you increase the current through this M21. That's why the gm increase, that's why you are gm enhanced.

So gm enhanced is outcome of the

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circuit that we built. That's the way I understand it.

Q. And is that the same or different than the gm-boost that you described, which also uses the current feedback?

MR. LIU: Objection to form.

A. Again, gm-boost is to provide actual current to the buffer driver. So in this case it's M21. As a result, the gm of the buffer driver circuits M21, the gm has increased. That's why I understand that, you know, we can refer that M21 the buffer driver circuit is gm enhanced. So it's not particular circuit. It's just to describe the buffer driver as being the gm of that buffer driver is being increased. So that's to the extent that I understand this term.

Q. Sir, we talked earlier with respect to both Rincon-Mora and Al-Shyoukh that neither of those references disclosed an enable/disable function, correct?

A. Correct.

Q. Why not?

MR. LIU: Object to form.

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A. I believe I mentioned that before. Because they do not show the biasing circuits, both Rincon-Mora and Al-Shyoukh, and that's why I cannot make that decision or judgment to even look for those enable and disable signals.

And that's why, you know, we discuss, you know, that enable and disable signal used into the biasing circuit is a common technique, such as the prior art that I show you in Ivanov, as an example, right, so...

Q. What are the drawbacks to using an enable/disable circuit?

MR. LIU: Objection to form.

A. I suppose that were related to some system design concerns. As I mentioned earlier, I did not perform system analysis in this particular case at this point. So I'm not ready to offer that opinions by sitting here today.

Q. And you didn't render any such opinions in your report, correct?

MR. LIU: Objection to form.

A. I don't recall that. I don't

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recall that I offered that kind of opinions other than showing that Ivanov circuit examples, you know, has this enable/disable signals.

Q. Would you agree with me that there are drawbacks to implementing an enable/disable function?

MR. LIU: Objection to form.

A. As I said, that would also be related to system level concerns, you know. I'm not ready to give that analysis or offer my opinions at this point.

Q. Would you agree with me that adding an enable/disable function would require additional circuitry?

A. That one is possible. You add the enable and disable signal. You may add some circuits, but that require further analysis to see exactly what context and circuit you would need it at.

Q. And you didn't do that analysis in your report, correct?

MR. LIU: Objection to form.

A. I don't recall that, correct.

Q. Would adding enable/disable

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functionality to a voltage regulator incur additional cost?

MR. LIU: Objection to form.

A. As I mentioned, I do need to do further analysis to offer that opinions.

Q. Would adding an enable/disable function to a voltage regulator make the voltage regulator response time faster or slower?

A. I don't quite see that context, how that's related. I can see, you know, it all depends on, you know, how you implement that particular enable and disable circuits for the regulators in order to offer that opinions whether the impact to the regulators.

Q. Is there any scenario that you're aware of in which adding an enable/disable function makes the voltage regulator faster?

MR. LIU: Objection to form.

A. That require me further investigation and to study this topic. You know, I'm not ready to offer that opinion sitting here today.

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Q. And you didn't do any analysis in your report regarding the impact on the speed of the regulator -- strike that.

Did you do any analysis in your report regarding how adding an enable/disable function would impact the speed of the Rincon-Mora or Al-Shyoukh voltage regulators?

MR. LIU: Objection to form.

A. I don't remember that, that I did analysis of that enable and disable and how that impact the regulator speed of Rincon-Mora and Al-Shyoukh.

Q. Do you know how much current would be required to operate the enable/disable circuitry in Ivanov?

MR. LIU: Objection to form.

A. So in Ivanov, you refer to that shutdown signals. And, you know, judging from the schematic -- you know, the block diagram, sorry, from Ivanov, you know, it come to this box, which is called shutdown control. They do not show those details. I don't think I can offer that opinions or analysis, you know, as to, you know, what

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cost that is adding.
Q. What are the considerations that a POSITA would take into account when deciding whether to add an enable/disable function to a voltage regulator?
MR. LIU: Objection to form.
A. Those are typically related to system label requirements. If the system would require the regulators to shut down, then I can imagine that, you know, a designer would implement this enable/disable signal to support that function.
Q. And what are the considerations that they were take into account when deciding whether to add an able/disable function to the system?
A. Sorry, can you please repeat your question?
Q. Yeah, what are the considerations that a POSITA would take into account when deciding whether to add an enable/disable function to a voltage regulator in a system?
A. Okay. So, for example, if you

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may not need to use the device, then because the parts of circuit you may not need to use anyways, you may use that enable/disable to save the power.
As a result, you improve the power efficiency of the entire circuits. So that's maybe one way that designers or engineers, you know, may decide, you know, to adopt this function.
Q. What other considerations would they take into account?
A. So in that example that I mentioned earlier, you know, basically, you know, how much power consumption that, you know, the system can tolerate or can accommodate. And remember a few hours ago we discuss about the battery, right. So your battery, how much that you want your batteries to send for that device.
So all those are the concerns to consider.
Q. Is power efficiency the only thing a POSITA would consider when evaluating whether to add an enable/disable function.

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A. I would say that's a very basic and fundamental sort of aspect to consider, you know, power efficiency, because when you disable the part of the circuit that you don't actually need to use, you conserve the power consumption -- you conserve energy, so...
Q. Would a POSITA also consider the cost that would be incurred when deciding whether to add an enable/disable function?
A. I believe that's a very general questions. The cost, you know, can mean many different things. It can be the cost of the dollar that you pay, it can be the cost of the power consumption. So in this case, yes, the power consumption is one of the major concerns. That's why you use this enable and disable signal to save the power, which means you save the cost, right.
So in that form, in general, yes, you know, you do this, you know, to save certain cost, you know, of your design.
Q. Would a POSITA consider the additional cost to design the system and

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add the enable circuitry?
A. Still come down to the power consumption. You know, at this point, you know, I'm not able to form that opinion. So I'll need to do further analysis, you know, to consider, you know, all the different type of system of circuits, you know, because then they have different cost constraints.
Q. Would a POSITA consider the impact that an enable function would have on the speed of the voltage regulator when deciding whether to implement an enable function?
A. It also depends on the circuit that you build, you know, in some circuits, you know, you simply don't care about the speed, for instance. So it's not even a concern. Yeah. So it really depends on the context of the circuit that we were evaluating.
Q. Would a POSITA consider the size of the additional circuitry necessary to when deciding whether to add an enable function?

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A. Well, again, this would be another generic question, right. So, in general, when POSITA design the circuits, you always need to concern about the size that you use, right, the size that you use for all these devices, you know, will affect the circuit performance.

So, in general, it doesn't matter it's enable/disable, even for the circuit that we're seeing here. You know, it is one much design consideration for designers.

Q. If a voltage regulator had high quiescent current, would that provide a motivation for a POSITA to add an enable/disable function to the voltage regulator?

A. If that's a large quiescent current, it should start to, you know, contribute significant part of the overall power consumptions, right. Then that would motivate a POSITA to use the enable/disable circuits, you know, to reduce the currents.

Q. Would the amount of quiescent current that a voltage regulator uses

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relative to the amount of current used by an overall system impact a POSITA's decision on whether to add an enable signal to the voltage regulator?

A. I don't think I can offer that answer at this point. As I mentioned earlier, when you decide the circuiting system, there are just so many consideration to consider, right. It's not just in one single angle on this biasing of the regulators or whatever the circuit that you provide.

Also, there's also part of the SOC that you need to consider. So typically that would need to be considered jointly.

Q. And you said there were many considerations that would need to be taken into account.

Can you identify for me what those considerations are?

A. So, counsel, I believe I have mentioned a few, right. So even for the cost, the dollar amount, you know, when you, send this to the foundries, to

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manufacture these circuits, you know, how much cost that you're doing, right.

The time to market is also another big concern, in general. And the power consumption obviously is another thing that we talk about, which I offer my opinions, right. That's how this enable/disable signal can help to improve that power consumption, power efficiency.

Q. I'm sorry, go ahead.

A. So yes, so there are a lot of different design consideration.

Q. Would a POSITA consider the amount of quiescent current that a voltage regulator uses when determining whether to add an enable function to that voltage regulator?

MR. LIU: Objection to form.

A. I think it will be one of the consideration, but as I mention earlier there are also other consideration that the designer will consider collective.

Q. And you didn't analyze any of those considerations in your report, did you?

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MR. LIU: Objection to form.

A. I don't recall that, but counsel let me quickly check this.

So, counsel, the most relevant ones regarding to our discussions is on page 38, paragraph 70, and that's the power efficiency that we just talk about -- or I just talk about. I don't see other considerations that I've analyzed in my report.

MR. JENSEN: Thank you, Dr. Chen, for your time today. I don't have any further questions at this point, and I'll reserve the balance of my time for any recross if your counsel has any redirect questions.

MR. LIU: Can I take a few minutes to think about whether we need any redirect?

MR. JENSEN: How long would you like?

MR. LIU: Fifteen minutes?

MR. JENSEN: Let's go off the record.

THE VIDEOGRAPHER: The time is

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5:38 p.m. and we're going off the record.
(Recess taken from 5:38 p.m. to 6:03 p.m. PT)
THE VIDEOGRAPHER: The time is 6:03 p.m. and we're back on the record.
MR. LIU: So Petitioner doesn't have any questions for the witness.
So with that, we'd like to conclude the deposition. But we would like to reserve the right to take the standard amount of time to review and make corrections to the transcript.
MR. JENSEN: Thank you again, Dr. Chen, for your time.
THE WITNESS: Sure. Thank you.
THE VIDEOGRAPHER: Okay. Then the time is 6:04 p.m. and we're going off the record. Thank you, everyone.
MR. JENSEN: Can I ask the court reporter, just for scheduling purposes, what's the standard turnaround time on, I guess, the final and the rough?

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THE COURT REPORTER: I believe two weeks, 10 business days, and I have you down for a rough.
MR. JENSEN: Okay. Let me just look at my calendar and see.
THE COURT REPORTER: Stephen, do you need the rough as well?
MR. LIU: Yes, Please.
MR. JENSEN: That should be fine.
THE COURT REPORTER: You can always contact the office if you need it sooner.
(Time noted: 6:04 p.m. PT)

_____
DR. MICHAEL S. CHEN

Subscribed and sworn to before me this ___ day of _____, 2024.

_____

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REPORTER CERTIFICATE

I, JOAN FERRARA, do hereby certify:
That said proceedings were taken at the time and place herein named; and that the transcript is a true record of the testimony as reported by me, a disinterested person, and was thereafter transcribed.
I further certify that I am not interested in the outcome of the said action, nor connected with, nor related to any of the parties in said action, nor to their respective counsel.
IN WITNESS WHEREOF, I have hereunto set my hand this 8th day of December, 2024.

Joan Ferrara
JOAN FERRARA, RMR, FCRR

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DEPOSITION ERRATA SHEET

Case Caption: Aptiv v. Microchip

DECLARATION UNDER PENALTY OF PERJURY

I declare under penalty of perjury that I have read the entire transcript of my Deposition taken in the captioned matter or the same has been read to me, and the same is true and accurate, save and except for changes and/or corrections, if any, as indicated by me on the DEPOSITION ERRATA SHEET hereof, with the understanding that I offer these changes as if still under oath.

_____
DR. MICHAEL S. CHEN

Subscribed and sworn to on the _____ day of _____, 2024, before me,

_____
Notary Public,in and for the State of _____