

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MEDIATEK INC.,
Petitioner,

v.

PARKERVISION, INC.,
Patent Owner

IPR2025-00030
Patent 8,498,593 B2

Record of Oral Hearing
Held: January 7, 2026

Before MICHAEL R. ZECHER, BARRY L. GROSSMAN, and
IFTIKHAR AHMED, *Administrative Patent Judges*.

IPR2025-00030
Patent 8,498,593 B2

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P R O C E E D I N G S

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JUDGE GROSSMAN: Good afternoon. We are here for a hearing in IPR proceeding IPR2025-00030 concerning Patent Number 8,498,593.

The Petitioner is MediaTek Inc. And the Patent Owner is ParkerVision, Inc.

With me here is Judge Zecher and on the screen is Judge Ahmed. He can see and hear everything in the courtroom except for the screens showing your slides. So when both for the court reporter's benefit as well as for Judge Ahmed's benefit, as you're going through your slides, please make sure you make reference to the slide number so that he can be on the right one. And the court reporter will make sure that the record shows which slide we're on.

The general rules, we laid out in our hearing order. Each side's going to have one hour. You can reserve time for rebuttal. The presentations will be similar to a Federal Circuit argument where there's no interruptions or objections during a party's presentation. If you have something you want to say, bring it to our attention when it's your turn at the podium.

Patent Owner has a LEAP practitioner, which is one of the programs that we started at PTAB that we're pretty proud of, the Legal Experience and Advancement Program. So they will get an extra 15 minutes for the Patent Owner's argument.

Let's see, if -- when -- I'll ask each party when they get up to the podium to both state their name and spell it for the record so that the court reporter gets it accurately. And let me know whether you'd like to reserve

1 any time and how much for your rebuttal.

2 I don't think we've got any outstanding motions in this case. And I
3 also don't think we have a protective order or any confidential information
4 that's going to be in the case. But if something comes up and there's
5 anything that's confidential, you ought to be aware that we do have a public
6 line, people can dial in and listen to the argument. So if you think you're
7 going to get into something that's confidential, let us know and we can
8 proceed accordingly. It likely won't happen because we haven't had any
9 confidential information submitted on this record.

10 With that, if any -- either any -- either party have any questions
11 about how we're going to proceed, questions for us before we get started?

12 MS. KAISER: Not for Petitioner, Your Honor.

13 MR. TO: Not for Patent Owner, Your Honor.

14 JUDGE GROSSMAN: Okay. Well, thank you. All right.
15 Petitioner has the burden; they will go first. And then the -- Patent Owner
16 will follow them. So I'll ask counsel for the Petitioner, you can take the
17 podium. Tell me how much time, if any, you'd like to reserve for your
18 rebuttal. And we'll get started.

19 MS. KAISER: Thank you, Your Honor. Jessica Kaiser from the
20 law firm of Perkins Coie for the Petitioner. With me today is Kyle
21 Canavera, all from the same law firm, as well as Evan Day. Mr. Canavera
22 and I will be splitting an argument today. And we would like to reserve 15
23 minutes for surrebuttal.

24 JUDGE GROSSMAN: I'm sorry?

25 MS. KAISER: Fifteen
26 minutes for rebuttal, Your Honor.

1 JUDGE GROSSMAN: Okay. Thank you. So you can proceed
2 whenever you're ready.

3 MS. KAISER: Very good. Good morning, Your Honors. And
4 may it please the Board. Based on the evidence in the record, MediaTek has
5 proven that all of the challenged claims are unpatentable by a preponderance
6 of the evidence. Patent Owner takes a scattershot approach to try to
7 undermine what Petitioner is showing, which we will discuss the arguments
8 that we want to highlight as well as anything that Your Honors are interested
9 in.

10 But in light of the papers and the evidence of the record, all of
11 those arguments should be rejected. Because of the scattershot approach and
12 the number of arguments, we've got a lot of ground to cover. So I'm going
13 to jump right in. If we go to Slide 2, so --

14 JUDGE GROSSMAN: I'd just like to mention -- I didn't in my
15 opening remarks, Ms. Kaiser -- but we've got electronic copies of the record,
16 and so we can have them on the screens in front of us. So if you see us
17 staring at the screens rather than looking over at the screen in the courtroom,
18 it's not like we're checking our emails. We've got it all in front of us and
19 will be looked at. At least for me, I find it easier to look at the screens in
20 front of me rather than the large screen in the courtroom.

21 MS. KAISER: Yes, Your Honor. And can you all hear me okay?

22 JUDGE GROSSMAN: Yes.

23 MS. KAISER: Great. So I'm going to start by talking about the
24 claim construction issue in this case related to limitation 1[b2] and
25 corresponding limitations and the other Independent Claims 9 and 15. Then
26 I'll proceed to discussing issues that are specific to the first set of grounds

1 that are the Hau-Yoshida grounds. And then my colleague, Mr. Canavera,
2 will discuss the second set of grounds, the Canyon-Ranjan grounds.

3 If we go ahead and go to Slide 6. So Slide 6 has Independent
4 Claim 1 on it. And the issues around independent claims really focus on
5 limitation 1[b2]. And this is a limitation that focuses on the bypass function
6 of the claimed power supply in Claim 1, method in Claim 9, and apparatus
7 in Claim 15. And if you look at 1[b2], the parties' arguments really focus
8 around that first clause, in response to a power efficiency of the power
9 supply exceeding a predetermined threshold.

10 But the limitation doesn't stop there. It goes on to say the aperture
11 generator and control module deactivates the switching device and passes
12 the input voltage to the output voltage node. And so this limitation really is
13 focused on satisfying condition, the power efficiency of the power supply
14 exceeding a threshold, and then an action that happens based on that. So the
15 bypass function happening based on that.

16 If we go -- I'm going to skip over Claims 9 and 15 because they
17 recite very similar limitations. So if we go then to Slide 10. And actually,
18 let's just go to Slide 12. So I'm going to jump right into the claim
19 construction argument. So the dispute here, really, is not so much about
20 power efficiency. It seems to me that from the parties' briefing, the parties
21 essentially agree on what power efficiency is. It's really more so what that
22 related phrase means, the -- in response to a power efficiency of the power
23 supply exceeding a predetermined threshold.

24 And if we go to -- actually, let's go to Patent Owner's Slide 7.

25 JUDGE GROSSMAN: And maybe before -- while you're
26 switching slides, one of the things -- I'll ask you a question. I'll sort of plant

1 the seed now but let you proceed as you'd like in claim construction. But
2 we've got a District Court claim construction order. And I'd like to hear
3 your position about whether we should or are obligated to accept what the
4 District Court did, or should we do something differently than the District
5 Court did. And if so, why?

6 MS. KAISER: Yes, Your Honor. So I believe the District Court
7 claim construction order is in Exhibit 1037.

8 JUDGE GROSSMAN: Yes.

9 MS. KAISER: And it related to the meaning of power efficiency.
10 And so I don't think it's necessarily in dispute that the Board cannot -- can
11 adopt the plain ordinary meaning as the District Court did for that term. But
12 that does not resolve the dispute that is in front of Your Honors, which was
13 not briefed in the District Court, which is really focused on what this phrase
14 means about the power efficiency of the power supply exceeding a
15 predetermined threshold.

16 So I don't think that's necessarily something that you have to get
17 into in your decision in terms of the District Court because I don't think
18 that's really what the dispute is in front of the Board for this, for the purpose
19 of the --

20 JUDGE ZECHER: Well, Ms. Kaiser, doesn't the District Court
21 touch on this dispute that you're about to bring up? Because I think there's
22 some discussion in the claim construction order about what power efficiency
23 encompasses. And the District Court goes out of its way to say power
24 efficiency is measured. How it's measured is outside the scope of the claim.
25 And I think that's what you're going to get into. But I mean, how do we
26 weigh that? I mean, that seems like a guiding light there a little bit, right?

1 MS. KAISER: Well, I don't think that we disagree that how power
2 efficiency is measured is outside the scope of the claim. I don't think the
3 claim itself specifies how power efficiency is measured. But I don't think
4 that either Patent Owner or Petitioner have argued that during runtime, that
5 is when the circuit is operating, the '593 specification doesn't include any
6 examples of a direct measurement of power efficiency. But, you know, you
7 wouldn't --

8 JUDGE ZECHER: Well, I guess my --

9 MS. KAISER: Yeah.

10 JUDGE ZECHER: My point is that if the scope of the claim
11 doesn't include measuring or determining power efficiency -- let's just use
12 those words interchangeably -- then why does it matter? I mean, to me,
13 couldn't it be determined in any given way that would fall within the scope
14 of the claim, as long as -- there's nothing specific that would limit what it is.

15 MS. KAISER: Yes, Your Honor. I agree with that.

16 JUDGE ZECHER: Yeah. So unless there's other language in the
17 claim that would somehow limit it in some fashion, which I don't see, given
18 the broad scope of the claim. I'm assuming you're getting into this. But I do
19 see this interplay between what the construction is and what the District
20 Court said and how we should look at this issue.

21 MS. KAISER: Yes, Your Honor. I think, you know, when the
22 Petitioner was explaining the issue that we saw with claim construction, that
23 is that it encompasses indirect measurements of power efficiency, such as
24 output, current, or voltage, we were thinking about that as opposed to
25 measuring the power efficiency directly. And we -- you know, as you've
26 noted, it doesn't -- because you do have to have something that you're

1 comparing in this limitation.

2 JUDGE ZECHER: You have to have a power efficiency, correct
3 -- right?

4 MS. KAISER: You have --

5 JUDGE ZECHER: But the claim -- the scope of the claim doesn't
6 tell you how you get it, right?

7 MS. KAISER: You don't have -- in terms of the -- if you read this
8 claim in the context of the specification, then what you're comparing to the
9 threshold doesn't have to be a direct measure of the power efficiency itself.
10 And I don't think that Patent Owner actually disagrees with that. If you look
11 at, for example, sur-reply page 11, the Patent Owner agrees that the
12 threshold that is recited in Claim 1 can be a voltage or a current. And
13 therefore, if the threshold is a voltage or a current -- and this is in their brief,
14 but this is the logical inference from that.

15 If the threshold itself is a voltage or a current, then the thing that
16 you're comparing against that threshold must also be a voltage or a current.
17 But Patent Owner accuses Petitioner of reading the term power efficiency
18 out of the claim. And that's not at all what we're doing. What we're saying
19 is that in the context of this specification and what the spec and also the
20 dependent claims tell us, that what is compared against the threshold can be
21 an indirect measure of power efficiency, like voltage or current. And so
22 that's what we were focused on in terms of -- in the petition in construing
23 this phrase.

24 Patent Owner takes it a little bit different approach. And instead of
25 looking at sort of what is compared to the threshold, which is really what
26 this claim is -- claim limitation is talking about, Patent Owner goes to how

1 the threshold is set. And so you can see here on -- this is Patent Owner's
2 Slide 7, they're focused on determining the power efficiency characteristics
3 of the power supply and setting a threshold based on that determination.

4 And there's nothing in the claim that talks about either of these
5 steps. So there's no determining the power efficiency step or characteristics
6 of the power supply itself steps. And then there's also no step that's about
7 setting the threshold. Threshold has to be predetermined. But there's
8 nothing that says that you have to predetermine that or set it based on a
9 determination of the power efficiency. And so this to us just seems like
10 something that Patent Owner has made up out of whole cloth that's not
11 supported in the language of the claims or in the specification.

12 JUDGE GROSSMAN: In the District Court, the Patent Owner
13 argued for what just said a plain and ordinary meaning. And the District
14 Court ended up adopting that as the claim construction. But that doesn't tell
15 us what it really means. I don't know that the Patent Owner has really
16 identified in the District Court proceeding or in this proceeding what the
17 plain and ordinary meaning is.

18 And maybe I'll give them some advance notice that that'll be one of
19 the questions that I have for the Patent Owner as to what is the plain and
20 ordinary meaning. And the plain and ordinary meaning could be the output
21 power of the power supply compared to the input power, which is what you
22 argued in the District Court.

23 MS. KAISER: Right.

24 JUDGE GROSSMAN: And so at least it'd be interesting, I guess,
25 if you've got a view as to what that plain and ordinary meaning is or whether
26 there's something in the specification that you can point us to, to help us

1 come up with what is the plain and ordinary meaning so that we understand
2 what's the difference between a plain and ordinary meaning that the Patent
3 Owner proposes and the output power compared to the input power that
4 you've proposed in the District Court and claim constructions that you had in
5 this case as to where that line is.

6 Or is the plain and ordinary meaning just the ratio, which is -- I
7 guess hasn't been decided by the District Court. And as I think you've
8 mentioned, we're not locked into the District Court proceeding. We'll
9 consider it, but we may not adopt the same claim construction.

10 MS. KAISER: Yes, Your Honor. So, you know, we explained in
11 the petition, as you noted, that our view is that the plain and ordinary
12 meaning of power efficiency is the output power compared to the input
13 power. Patent Owner makes a lot about compared being too vague and
14 really wanting it to be a ratio or expressed as a percentage. I don't think that
15 -- we don't dispute, for example, that power efficiency, for example, in the
16 specification is expressed as a percentage or that can be expressed as a ratio
17 or a percentage, certainly.

18 But I don't think that that issue about the precise definition for the
19 plain meaning of power efficiency really is what's at issue in terms of the
20 arguments that are made about the mapping of the references to this
21 limitation 1[b2]. It really does boil down to, one, does there have to be some
22 sort of direct measurement of power efficiency that's compared to the
23 threshold?

24 And for the reasons that I've stated both in our briefs and here, the
25 specification just doesn't support that. And the Patent Owner even admits
26 that the threshold itself can be an indirect measurement of voltage or a

1 current. And then the other --

2 JUDGE GROSSMAN: And is there a cite that you can give us
3 where they've made that representation or made that admission?

4 MS. KAISER: Sur-reply page 11, Your Honor. And then in sur-
5 reply page 11, the Patent Owner is talking about Dependent Claims 2 and 6
6 that further limit this bypass function limitation. And there, they say that
7 one understanding of Claim 1 could be that the bypass threshold is a voltage
8 or a current. I have to look to get the exact quote, but that's the gist of it.

9 And then the other dispute really seems to be: Does the threshold
10 itself have to be set based on a determination of the power efficiency? And
11 there, it's our position that's just not in these independent claims at all.
12 There's no setting limitation that ties the threshold to some sort of
13 determination of the power efficiency characteristics of the power supply.

14 And I really think that those two issues are the main show here in
15 terms of claim construction and that the Board doesn't need to, you know, go
16 beyond saying power efficiency gets its plain and ordinary meaning. I think
17 that gets you to where you need to go to resolve the disputes between
18 parties.

19 JUDGE GROSSMAN: Okay. So if I understand, your position is
20 really whatever claim construction we come up with of the variable
21 -- different forms of it -- of plain and ordinary meaning that might be
22 available to us, it's not outcome determinative.

23 MS. KAISER: I think that's right. As long as doing so wouldn't
24 exclude the threshold and the value being compared to the threshold from
25 encompassing indirect measurements of power efficiency, like a voltage or a
26 current.

1 JUDGE GROSSMAN: Thank you.

2 JUDGE AHMED: Ms. Kaiser, I had a question for you. The
3 claim recites voltage in other places, right? So shouldn't power efficiency
4 mean something different than just a measurement and comparison of
5 voltage itself, or would the ratio of just two voltage be enough?

6 MS. KAISER: So I think there are circumstances where a ratio of
7 two voltages can be enough because power can be expressed as a function of
8 voltage squared, a ratio of two voltages squared. And so in that way, the
9 -- and I'm thinking particularly about -- in how -- where it talks about power
10 equals -- or is a function of V squared over R . And so if you have those two
11 powers over each other, then that equation would just reduce to V squared
12 output over V squared input. So power is a function of voltage divided by
13 voltage.

14 JUDGE GROSSMAN: Yes. I think that's column 6, lines 40
15 through 42 -- or excuse me, 40. Yes, 40 through 44.

16 MS. KAISER: So I'm not sure if I answered your question, but I
17 hope I did.

18 JUDGE AHMED: You did. Thank you.

19 MS. KAISER: Okay. If we want to --

20 JUDGE GROSSMAN: So Ms. Kaiser, just to make sure I
21 understand, basically what you're saying is the big show here isn't the claim
22 construction issue. What power efficiency is, it seems that plain and
23 ordinary meaning or what you proposed, the District Court didn't see a lot of
24 difference between those two terms, I think, as we read their construction.

25 But whether or not, when we look at the claims, what kind of
26 -- whether or not these indirect measurements of power efficiency would be

1 encompassed within the claim. And then secondly, how the threshold is set
2 in this case being predetermined, right?

3 MS. KAISER: Yes, Your Honor. I think that it's -- there's no
4 question that the threshold has to be predetermined, that's in the claim.

5 JUDGE GROSSMAN: Right.

6 MS. KAISER: But the question is whether the claim requires a
7 specific way of predetermining it. And in that sense, the claim doesn't
8 specify that. And so it's our position that that's outside the scope of the
9 claim.

10 JUDGE GROSSMAN: It's kind of twofold. Does the claim
11 require a specific way of determining power efficiency? And then second,
12 does it require a specific way of determining threshold, right?

13 MS. KAISER: Yes, Your Honor.

14 JUDGE GROSSMAN: Yes.

15 MS. KAISER: I agree with that.

16 JUDGE GROSSMAN: Okay.

17 JUDGE AHMED: So Ms. Kaiser, just to be clear, you're saying
18 both of those are outside the scope of this claim, right, the manner in which
19 you determine the power efficiency and the way that you set the
20 predetermined threshold?

21 MS. KAISER: So what I would say is that the claim is not limited
22 to any specific way of predetermining the threshold. So it's not limited to
23 what the Patent Owner argues, which would be setting it or predetermining it
24 based on a determination of the power efficiency characteristics of the power
25 supply. That's outside the scope of the claim. The claim is not limited to
26 that.

1 On the other piece, what I would say is that what is compared to
2 the predetermined threshold -- that is the power supply or the power
3 efficiency of the power supply -- is not limited to direct measurements of
4 power efficiency, but that encompasses indirect measurements of power
5 efficiency, like measuring a voltage that you compare to a voltage threshold
6 or a current that you compare to a current threshold.

7 JUDGE AHMED: Okay. Thank you.

8 MS. KAISER: I think with that, unless the Board has other
9 questions about this claim construction argument, I will skip ahead to talk
10 about the Hau-based grounds, okay?

11 JUDGE GROSSMAN: I have one further question on the claim
12 construction. You had a second construction proposed in your petition for
13 aperture generator and control module, that phrase. And you asserted two
14 different constructions. One is that it shouldn't be a means plus function.
15 But then you took the precaution of saying if we disagreed with that, you
16 gave us the structure that was disclosed that would satisfy a means with
17 function and term and a construction under that situation.

18 When I read that, do we need to construe aperture generator and
19 control module? And should we -- if we do, isn't the construction -- whether
20 we said it's a means plus function or we accept the structure that you
21 identified, it's got to mean something because the word module doesn't have
22 a whole lot of structural significance to it, at least I haven't seen it in this
23 record as being a term of art. But do we need to construe it?

24 And if our construction, either way under a means plus function or
25 otherwise, it would result in the alternative construction that you proposed
26 with the structural elements that you identified. So is that part -- did you

1 still think we need to construe that phrase? And if so, if we construe it to
2 -- either way, doesn't it come out the answer is the same? It's the structural
3 elements that are identified in the specification.

4 MS. KAISER: So Your Honor, I would say you don't need to
5 construe that term, at least in part, because does it use means for there's a
6 presumption that it's not means plus function. And Patent Owner hasn't
7 argued that it is means plus function. So, you know, I think the outcome
8 largely is the same because Patent Owner also hasn't argued that that term
9 isn't met under either construction.

10 And we believe we've shown in the petition why, under either
11 construction, it is met. So I think to resolve the speeds (PHONETIC) that
12 are in front of you, you don't need to construe that term.

13 JUDGE GROSSMAN: Okay. Thank you.

14 MS. KAISER: Okay. Turn now to, let's see, Slide 35.

15 JUDGE ZECHER: This is of your presentation?

16 MS. KAISER: Of our presentation.

17 JUDGE ZECHER: Yeah.

18 MS. KAISER: Petitioner's presentation, yes. Thank you, Judge
19 Zecher. So Ground 1A relies on the combination of the Hau reference,
20 which is Exhibit 1007, and the Yoshida reference. And really, all of this
21 party's disputes revolve around Hau's teachings. So I'm going to focus on
22 that reference.

23 And if we go actually to Slide 39. So the only dispute for Ground
24 1A as to the independent claims, again, it goes back to the limitation that
25 we're just looking at, 1[b2]. And Patent Owner makes a couple of
26 arguments here that are shown on this slide: one is that the petition conflates

1 RF power and supply power; the second one being that the petition failed to
2 account for variations in current; and the third being that the bypass function
3 doesn't involve power efficiency determination.

4 So if we turn to that first issue, we go to Slide 39, please -- or Slide
5 41. Thanks. So in terms of the Hau's bypass circuit and the efficiency
6 threshold, what Hau's circuit does is it uses P_{det} , which is identified in pink
7 here, which is proportional to the input voltage V_{in} .

8 JUDGE GROSSMAN: What slide is that that you have on your
9 screen?

10 MS. KAISER: I believe it's 41.

11 JUDGE GROSSMAN: Thank you.

12 MS. KAISER: And then the -- Hau also discloses that the
13 maximum output power is proportional to the square of V_{C2} (sic), which
14 you see here highlighted in green. And so Hau teaches us that there is less
15 linear relationship between P_{det} and V_{C2} .

16 If we go to the next slide. Petitioner's expert also explains this
17 relationship. And here, we've got some quotations from his reply
18 declaration. So this is Exhibit 1031, paragraphs 41 and 42, where Dr.
19 Larson explains the relationship between V_{C2} and P_{det} and then why the RF
20 versus supply power issue is a essentially irrelevant because the power
21 output from PA1 is measured by P_{det} that's proportional to the supply
22 voltage V_{C2} and the RF power in -- I think the most important thing on this
23 slide is that last sentence on paragraph 42 where Dr. Larson clarifies that the
24 RF power signal -- that is R_{Fin} -- is the signal that's being amplified by PA1,
25 while V_{CC2} provides the power for PA1.

26 And so really, this argument about supply power versus RF power

1 is red herring because Dr. Larson explains what the difference is and why
2 the thing that's being measured in Hau is what is being compared in that
3 1[b2] limitation.

4 If we go to Slide 43. There is also an argument in the sur-reply
5 -- this is at sur-reply 11 -- that Hau's Figure 5 is focusing on the output
6 power of the amplifier and not the output power of the power supply. But
7 the overall efficiency is indicative of the power supply efficiency because
8 power out of the amplifier is proportional to power in, as Hau explicitly
9 discloses. And that's at column 6, lines 26 through 37. And the claims aren't
10 restricted to where precisely the measurement is taken to determine the
11 threshold.

12 Okay. So then we go to the second argument. I want to make sure
13 I give Mr. Canavera enough time to talk about the Canyon-based grounds.
14 So just quickly on the issue, if we go to Slide 45, on -- and this is on the
15 issue of accounting for variations in input and output current. The claims
16 don't require the bypass to account for this and the specification doesn't talk
17 about this. Instead here we've got on the slide the patent at Figure 4, it
18 compares the output stage voltage control.

19 This is in the challenge patent to the threshold voltage. So there's
20 no input or output current signal. And so again, this is really something
21 that's a red herring that's outside the scope of the claims.

22 And then if we go to the third argument -- I will skip ahead to
23 Slide 49. So ParkerVision argues that there's no power efficiency
24 determination. And really, this ties most directly back into the claim
25 construction discussion that we were having earlier where, again,
26 ParkerVision's requiring some sort of determination of the power efficiency

1 characteristics during the design process. Again, that's outside the scope of
2 the claim.

3 And the other pieces on here really are also things that are outside
4 the scope of the claim. Their provision seems to require some sort of linear
5 relationship between efficiency and the value that's used to measure the
6 threshold. Again, that's outside the scope of the claim.

7 Okay. If there are no more questions about Claim 1, I'll just
8 highlight a few things quickly from the dependent claims. If we go to Claim
9 2, and I think this starts -- actually if we can go to Patent Owner's Slide 35.
10 So Claim 2 is one of the dependent claims that further limits the -- that 1[b2]
11 limitation and talks about the threshold being based on the current. Do we
12 have the slide that has the claim language on it?

13 Yeah. So Claim 2, just to set the stage, is where we're talking
14 about deactivating the switching device based on a load current at the output
15 voltage. And in the petition, we explained why it would be obvious to use
16 current in H_{au} instead of voltage for this purpose. I just want to point out on
17 Patent Owner's Slide 35. So if we go back to that, you know, H_{au} itself
18 talks about using V^2/R relationship for power as we talked about
19 earlier.

20 And that's just equivalent to using Ohm's law, essentially the V
21 equals IR formula to remove I as a variable. And just as a matter of math,
22 the same thing works for removing V as a variable. So you end up with
23 power equals $I^2 R$. So I think the petition lays out the
24 obviousness rationale for Claim 2.

25 And we would rest on that unless Your Honors have questions.
26 There's a number of other dependent claims, but unless Your Honors have

1 questions, I think we'll rest on the briefs for those and turn to the Canyon-
2 based grounds.

3 MR. CANAVERA: Good afternoon, Your Honors. Kyle
4 Canavera representing MediaTek. Let's go to Slide 69. So I'll address the
5 Canyon plus Ranjan grounds, in particular, I'll address Ground 2A because
6 the dependent claims in Grounds 2B and 2C are duplicative over the various
7 Grounds 1.

8 Let's go to Slide 70. The combination for Canyon and Ranjan is
9 fairly straightforward and involves a rather small modification of Canyon.
10 On this slide, you see the circuit of Canyon in Figure 1. And at a high level,
11 what Canyon has is a power control circuit 110 that provides power to this
12 amplifier 120. And what Canyon describes in particular is that you can have
13 a DC-to-DC converter, which was well-known at the time. That's really
14 embodied in the regulator 160.

15 But you can also have a bypass circuit 190 which you can activate
16 under certain circumstances when you want to bypass the DC-to-DC
17 conversion. Canyon itself explains that why might you want to -- or when
18 might you want to activate the bypass circuit. Well, you might want to do
19 that when the output power gets especially high. And Canyon gives an
20 example for a particular output power that might be used to activate the
21 bypass circuit.

22 Then let's go to Slide 71. This is the key disclosure of the Ranjan
23 reference. And this is Figure 3. And in particular, Ranjan is a paper that is
24 analyzing certain power characteristics of a CDMA application. And in
25 Figure 3, in particular, Ranjan looks at the power efficiency on the Y axis of
26 two different things, number one is the line labeled DC-DC converter

1 system.

2 So Ranjan is analyzing the power efficiency of when you are using
3 a DC-to-DC conversion for an amplifier. And then on the line labeled
4 constant VDD, that is a measure of the power efficiency when you are not
5 using the DC-to-DC converter and you're just providing the supply voltage
6 to the amplifier.

7 And then there's a third line here that comes up for some
8 dependent claims. There's also a charting of the probability distribution
9 showing the probability of various operating output powers for this
10 particular CDMA application.

11 And what we've done, as shown in Slide 71 and as we did in the
12 petition, is show that Ranjan has the same basic operation observation is
13 Canyon, namely DC-to-DC converter is useful but at high enough power
14 levels, it becomes inefficient. Canyon makes that observation, shows you a
15 circuit and how you can switch between using the DC-to-DC converter and
16 not using it.

17 Ranjan shows an actual calculation for a particular application
18 under CDMA where those lines cross each other, where one is more efficient
19 versus the other. And as I'll discuss in a moment, the combination -- if we
20 go to Slide 73 -- pardon me, 72 -- is basically that Canyon says I have a new
21 circuit that will use -- that will bypass the DC-to-DC converter under certain
22 circumstances, such as high power. I'll give you an example range, Canyon
23 says.

24 Ranjan says here's how you can figure out the optimal spot where
25 those two power efficiencies cross each other, where it becomes more
26 efficient to use the DC-to-DC converter versus not. The combination is

1 really that -- use that teaching from Ranjan and the circuit from Canyon.

2 Let's go to Slide 73. ParkerVision raises three basic disputes as to

3 the motivation to combine Canyon and Ranjan. Let's go to Slide 72

4 -- pardon me, 74. The first one is basically, ParkerVision, if I could

5 summarize it, is saying Ranjan's circuit is so different from Canyon that a

6 person of skill in the art would never think to use the two together.

7 ParkerVision hangs a lot of their argument on the observation that Ranjan

8 shows an amplifier circuit but does not have a bypass path in that circuit and

9 emphasizes various other differences between the amplifier in Ranjan and in

10 Canyon.

11 Let's go to Slide 75. This is sort of fundamentally just not

12 approaching obviousness from the right perspective. We are not proposing

13 to take Ranjan's amplifier circuit and put it into Canyon's. We're not

14 proposing a bodily incorporation. We are just taking that teaching from

15 Ranjan about how to figure out how to dechart and figure out where the

16 power efficiency lines cross each other, take that teaching to modify

17 Canyon.

18 So the fact that there are some differences between the references

19 is sort of inherent in this being an obviousness ground. If Ranjan had all the

20 features of Claim 1 and this teaching, then I guess it would be an

21 anticipation ground. We present it as obviousness. That's how obviousness

22 works.

23 JUDGE GROSSMAN: My understanding that your position on

24 Ranjan is just that Ranjan clearly discusses that at some points, one is more

25 efficient than the other and it tells you how to calculate that.

26 MR. CANAVERA: True.

1 JUDGE GROSSMAN: And you're still relying on Canyon as a
2 threshold shift. At some point you can say, hey, if one's more efficient than
3 the other at this level, maybe we want to turn it on or off at that level so we
4 can shift from A to B.

5 MR. CANAVERA: Exactly, Your Honor.

6 JUDGE GROSSMAN: Okay.

7 MR. CANAVERA: Canyon has a threshold already. It already
8 has a power-based threshold. We're only relying on Ranjan for -- to the
9 extent the claims require it, and as I think we've discussed, we would say it
10 doesn't. But to the extent they require some very specific calculation
11 determination of a power efficiency threshold and it being somehow shown
12 in the reference that that was, you know, in the thought process of coming
13 up with a threshold, even if that's required, Ranjan has that.

14 JUDGE GROSSMAN: And I take it it's your position that the
15 patent neither claims nor really discloses a specific way of identifying or
16 switching at that threshold level. It just says when you reach the threshold,
17 you shift. It doesn't tell you how you shift exactly or -- it just says you shift.

18 MR. CANAVERA: That is absolutely right for the claims. That's
19 mostly right for the specification. There is -- actually, similar to Ranjan as
20 sort of example, some example charts in the specification about -- they're a
21 little hard to piece together at times. But there are some example charts
22 similar to what Ranjan shows in the spec, not in the claims.

23 JUDGE GROSSMAN: Okay. Thank you.

24 MR. CANAVERA: And then the last point on this first part of the
25 motivation to combine is just that the idea that a person of skill in the art
26 would not look to these two references together is somewhat curious for the

1 fact that it seems that the inventors of Canyon look to Ranjan. As shown on
2 Slide 75, Ranjan is cited on the face of Canyon.

3 Canyon doesn't attribute this observation about high power making
4 DC-to-DC conversion efficient. But that is the sort of teaching of Ranjan, or
5 at least a disclosure of it. And Canyon builds a circuit that exploits that
6 observation. So certainly, it seems like, at least the inventors in Canyon, we
7 would say for sure a person of skill in the art would be looking into these
8 two references.

9 Let's go to Slide 76. The second motivation to combine argument
10 is, I think, in the patent response. It's phrased as the Canyon is complete on
11 its own, and so a person of skill in the art would not look to supplement it
12 with Ranjan's teachings.

13 Let's go to Slide 77. I think this again is just really not how
14 obviousness proceeds. A person of skill in the art doesn't stop thinking or
15 considering references just because the prior reference has an operation
16 circuit.

17 But let me address some points here because they do relate to an
18 argument about the actual feature itself. In particular, here's what Canyon
19 discloses that's particularly relevant. Canyon explains that you want to
20 activate this bypass circuit and it gives an example of when the power output
21 gets especially high. Canyon gives you an example and says you can use
22 when the power output is between 22 and 24 dBm. That is explicitly in
23 Canyon itself.

24 What Canyon doesn't do, though, is tell you, number one, how
25 Canyon came up with 22 to 24 dBm, whether that would change under
26 various implementation details. It is itself a range, so it is not a specific

1 value that you would program into a circuit, for instance. And it is explicitly
2 an example for all those four reasons.

3 A person of skill in the art has a very, very important teaching
4 from Canyon and has a circuit that implements it but would be curious about
5 if I'm implementing this, how do I choose that threshold value? Ranjan is a
6 place where a person of skill in the art would look. It completes the story. It
7 says what is the actual optimal spot to switch to set that threshold and shows
8 you how you calculate that.

9 So as to this issue, I think an argument of completeness is not the
10 right way to approach obviousness anyway. But Canyon itself opens the
11 door to Ranjan's teaching.

12 Let's go to Slide 79. The final argument in this also relates to the
13 actual claim elements, so I'll address it here. It deals with Canyon itself. Its
14 ParkerVision attacking how Canyon itself works, how its disclosure relates
15 to itself, in particular Figures 1 and 2.

16 So let's go to Slide 80. The way I would summarize the argument,
17 as we understand it, is this, Canyon has a Figure 1 and a Figure 2, which are
18 very similar circuits and are described together in the spec. Figure 1 is
19 introduced and some of the circuit is described. Figure 2 is introduced and
20 some of the circuit is described. Then there is a question that ParkerVision
21 raises about whether a paragraph that follows that is only describing Figure
22 2 or describing Figure 1 and Figure 2.

23 As I'll address, it seems pretty clear from Canyon that that
24 paragraph is describing both. And as we described in the petition and in the
25 reply, even if it were only describing Figure 2, certainly, a person of skill in
26 the art would look to that disclosure for completing the story on Figure 1.

1 Let's go to Slide 81.

2 JUDGE ZECHER: Mr. Canavera, doesn't Figure 1 and Figure 2
3 have effectively the same elements?

4 MR. CANAVERA: A hundred percent, Your Honor.

5 JUDGE ZECHER: Regulator, controller, power meter, bypass.
6 The only difference I could see is a different location of the power meter.

7 MR. CANAVERA: That's right. The only difference between
8 Figure 1 and Figure 2, and we can see this on Slide 81, is where the power
9 meter is located. The control signal X -- it's a key control signal -- is the
10 same. It's the same controller -- the same controlling the bypass circuit.

11 Here is, maybe even more important than the fact that they have
12 the same elements, that bypass circuit is labeled 190 in both Figure 1 and
13 Figure 2. And if Your Honors look into the patent, Figure 1 is introduced at
14 the top of Column 3 and some elements are described.

15 The bypass circuit 190 is never discussed. Canyon doesn't tell us
16 how it operates until -- now we get to -- Figure 2 is introduced, column 3,
17 line 44. The bypass circuit in Figure 1 has not been discussed at all. Then
18 Figure 2 is discussed to some degree.

19 We get to column 4. Only in column 4, line 14 or 15, does the
20 bypass circuit even get brought up. And now, it gets discussed. And now,
21 it's that key example of 22 to 24 dBm as the threshold.

22 ParkerVision wants us to read this as, well, because that passage at
23 column 4, line 14 through 29, comes after the introduction of Figure 2, it can
24 only be applied for Figure 2. If that were the case, then Canyon just
25 mysteriously never tells us anything about the bypass circuit 190. We're just
26 left to wonder what could be in that box.

1 That's not how this patent is written. It clearly is describing both
2 of those when it mentions bypass switch 190 starting in column 4. So the
3 teachings as to this example threshold do apply to Figure 1 as well as Figure
4 2.

5 If we go to Slide 82, briefly, that same passage also refers to the
6 amplifier consuming power, which ParkerVision's expert agreed would
7 mean the power going into the amplifier, which is how Figure 1 is arranged.
8 And then if we go to Slide 83, again, to the extent that they were right -- and
9 we don't think they are based on Canyon itself -- certainly, a person of skill
10 in the art, if they were left with a sort of black box for bypass, the bypass
11 switch 190 for Figure 1, they'd have to look somewhere to understand how
12 to implement that. Conveniently, in the next column it tells you how to do
13 that.

14 And then importantly, ParkerVision argues that a person of skill in
15 the art couldn't do that because the power meter is before the amplifier in
16 Figure 1, whereas in Figure 2, it's after the amplifier. And so ParkerVision
17 points out that in Figure 1, in the written description, it's called a current
18 meter 180, even though in the diagram it's a power meter. And then it
19 measures current. And ParkerVision says, well, a person of skill would
20 throw their hands up and say, I don't know how to get from current to power.

21 Even though that's not right technically, it also just doesn't get past
22 the paragraph in Canyon itself where Canyon says, at length, as shown on
23 Slide 83, yes, that current reading is indicative of the power reading. And
24 Canyon itself tells us that. The very last sentence there is, in this way, the
25 current signal X can also be considered indicative of the power output level
26 of the power amplifier unit 120, which is what is getting measured in Figure

1 2.

2 So even Canyon says that so that argument doesn't make sense. A
3 person of skill in the art knows that you need current to get power. You can
4 read it before the amplifier to get power out here. So that then I can turn
5 now --

6 JUDGE GROSSMAN: Is there any dispute about what the level of
7 ordinary skill is in this case?

8 MR. CANAVERA: I believe the wording was slightly different,
9 but neither party has raised that as a dispute.

10 JUDGE GROSSMAN: Essentially, a bachelor's degree and
11 relevant technology and two years of experience.

12 MR. CANAVERA: I believe that. Right. I'd have to check the
13 exact years we came up with in this one. But yes, Your Honor, it's similar to
14 that. That addresses, honestly, the arguments for the most part about Claim
15 1, that they actually argue for the elements. Unless Your Honors -- in the
16 sake of preserving some time, unless Your Honors have any questions, I'm
17 going to hand the podium briefly to my colleague, Ms. Kaiser, and then I
18 think we'll pass the podium.

19 JUDGE GROSSMAN: Just to let you know, you're into your
20 rebuttal time.

21 MS. KAISER: Thank you.

22 JUDGE GROSSMAN: Yeah.

23 MS. KAISER: I just wanted to make a correction --

24 JUDGE GROSSMAN: Ms. Kaiser, thank you.

25 MS. KAISER: -- knowing that we're eating into our rebuttal time.
26 It said confidently that the admission that I was talking about -- in response

1 to your question, Judge Grossman -- was on sur-reply page 11, I wanted to
2 correct that. It's actually on sur-reply page 9, so apologies.

3 JUDGE GROSSMAN: Okay.

4 MS. KAISER: I was confident about my wrong answer, but it's
5 sur-reply page 9.

6 JUDGE GROSSMAN: I didn't see it at all, so.

7 MS. KAISER: That it's at the top sort of page 9.

8 JUDGE GROSSMAN: Okay. Thank you. Okay. So you've been
9 -- you've used about 2 minutes and 55 seconds into your rebuttal time.

10 JUDGE ZECHER: 12 minutes left.

11 JUDGE GROSSMAN: So Patent Owner, whenever you're ready,
12 you may proceed. The first question will be whether you'd like to reserve
13 any rebuttal time?

14 MR. TO: Yes, I would. 15 minutes, please, Your Honor.

15 JUDGE ZECHER: Okay. That's right. And he's got the 15
16 minutes.

17 JUDGE GROSSMAN: Yes. You will have an extra 15 minutes.
18 And you're going to reserve 15 of that, so now you'll have 75 minutes for the
19 total presentation.

20 MR. TO: Thank you, Your Honor.

21 JUDGE GROSSMAN: Okay. And you may begin whenever
22 you're ready.

23 MR. TO: Good afternoon, Your Honor. May it please the Board.
24 My name is Anderson To, from the law firm Daignault Iyer, appearing for
25 the Board for the first time on behalf of Patent Owner ParkerVision. Your
26 Honors, the '593 Patent is directed towards optimizing the power efficiency

1 of the power supply and amplifier system based on the transmission scheme
2 of the device and also setting a threshold of the bypass switch based on
3 power efficiency determination.

4 Although the power discloses bypass switch, the threshold in the
5 prior art for activating that bypass switch has nothing to do with power
6 efficiency. And because of this efficiency, the Petitioner's case for
7 unpatentability relies on a claim construction that is completely divorced
8 from the plain meaning of the claims and also on motivation to combine that
9 is viewed by hindsight.

10 I would like to start by addressing claim construction. Before I get
11 into our arguments, I want to note that Petitioner's counsel is wrong that the
12 claim construction of the term power efficiency is not outcome
13 determinative. It is at least outcome determinative with respect to Ground 1,
14 the Hau grounds. And this is because in the petition, Petitioner never
15 alleged that Hau has any type of ratio.

16 The only thing that was alleged in the petition is that Hau discloses
17 a voltage threshold -- a voltage. And that voltage is compared to a voltage
18 threshold. So if the claims are construed to require a ratio, Ground 1 would
19 just disappear.

20 JUDGE GROSSMAN: In your District Court claim construction
21 argument, you just argued for plain and ordinary meaning and convinced the
22 District Court judge to adopt the plain and ordinary meaning. But I didn't
23 see, at least at the District Court level, where you said the plain and ordinary
24 meaning is the ratio of output power to input power. Is that -- so are you
25 telling us now that the plain and ordinary meaning is that ratio of output
26 power to input power?

1 MR. TO: Your Honor, I believe that the plain and ordinary
2 meaning that the District Court adopted requires a ratio and --

3 JUDGE ZECHER: Well, to be fair, he actually said he adopted
4 your construction of plain and ordinary meaning. What he was talking about
5 is the analysis, he said a POSITA would understand the term power
6 efficiency is simply the ratio of the output power of a component as
7 compared to the input power. So now you're saying a ratio is required as
8 part of the plain and ordinary meaning?

9 MR. TO: Our position is that a POSITA would understand power
10 efficiency to be referring to a ratio. And this is consistent with how the
11 specification describes --

12 JUDGE ZECHER: Okay.

13 MR. TO: -- power efficiency.

14 JUDGE ZECHER: Well, the next line actually in his analysis
15 here, he says, defendants proposed construction reflects this plain and
16 ordinary meaning. So it almost seems like Judge Albright here was saying
17 that whatever the plain and ordinary meaning is -- whatever he had in mind,
18 be it a ratio, whatever -- that there's not much daylight between that and
19 what the defendants proposed.

20 So I guess I'm a little confused. Do you see a material difference
21 between a ratio of the output power of a component compared to the input
22 power versus what MediaTek proposed here and in the District Court, the
23 output power of the power supply compared to the input power?

24 MR. TO: I do, Your Honor. Perhaps I can point you to what
25 Petitioner's expert said on this subject matter.

26 JUDGE ZECHER: Okay.

1 MR. TO: Let me go to the slides. So omitting the phrase ratio, as
2 Petitioner did here, is actually significant.

3 JUDGE GROSSMAN: Mr. To, is --

4 MR. TO: Yes. If I were to -- sorry.

5 JUDGE GROSSMAN: If you could identify the slide that you put
6 on the screen.

7 MR. TO: Sorry, Your Honor, this is Slide 4. So during
8 deposition, Dr. Larson admitted that a comparison between output power
9 and input power is subject to multiple definition. And he even used the term
10 vague.

11 What the plain and ordinary meaning is that the District Court
12 adopted -- and we think it's the correct meaning that a POSITA would
13 understand it to be, is that it is a ratio. It is output power divided by input
14 power. And it's just either a ratio or it can be expressed in a percentage. If
15 that -- if properly construed, Hau doesn't have a ratio at all.

16 JUDGE ZECHER: Well, I guess I'm confused how this language
17 or this deposition testimony helps you. I mean, we're talking about the term
18 is power efficiency. We're not talking about the term compared.

19 Now, power efficiency, as I understand it, the way you both look at
20 it, whatever it means, it has this comparison. But now, we're talking about
21 construing terms that are part of the definition of the term. So we're down a
22 wormhole. So it's just a little confusing to me what I'm supposed to take
23 from this deposition testimony here.

24 MR. TO: Well, in the deposition testimony, I believe Dr. Larson
25 testified that his -- under his construction of comparing output power to
26 input power, that actually encompasses subtraction, addition, and all these

1 other mathematical modifier. It's not just a division. So there is a significant
2 difference between their construction, which encompasses a variety of ways
3 of comparing the two, versus the ratio, which is output power divided by
4 input power. And this is how a POSITA would understand it to be.

5 JUDGE ZECHER: So as I understand, you just said the ratio is
6 required for construing power efficiency and it requires this division. Is that
7 what you're saying?

8 MR. TO: Yes, Your Honor.

9 JUDGE ZECHER: Okay.

10 MR. TO: And like I mentioned earlier, Your Honor, this is
11 consistent with how the specification describes term power efficiency. The
12 specification consistently and only describe power efficiency in terms of
13 ratio or percentage, which is the ratio multiplied by 100. I think Dr. Larson
14 acknowledged this fact. During deposition, he stated that, yeah, there's
15 every numerical quantification that is in the '593 Patent is a either ratio or
16 percentage.

17 JUDGE GROSSMAN: Mr. To, could you give us a citation of the
18 sections of the specification that you think do as you just described?

19 MR. TO: Yes, Your Honor. If I can refer you to Slide 5, it's
20 Exhibit 001, column four, line 35 to 56.

21 JUDGE GROSSMAN: Okay. Thank you.

22 MR. TO: So I think Counsel earlier also mentioned that the
23 construction of power efficiency is not at issue here. And this is actually
24 telling. The reason why this is not at issue is because Petitioner never
25 applied their own construction when analyzing the claims. The real purpose
26 of Petitioner's proposal of a construction is to open the door to their real

1 interpretation of the claims, which is it only requires -- it encompasses
2 indirect measurement of power efficiency.

3 Petitioner's position in this regard is based on an improper
4 limitation of the claims to the preferred embodiment of the '593 Patent. I'll
5 give you -- if we read the preferred embodiment in the context of the entirety
6 of the specification, you would - Your Honor would see that the output
7 threshold in the preferred embodiment is actually determined based on
8 power efficiency. And if I may, I would just elaborate on this.

9 JUDGE GROSSMAN: Mr. To, when you're talking about their
10 indirect advocacy, we don't have to adopt it as I've discussed earlier. But in
11 trying to be consistent, the same patent, the same words are before the
12 District Court and before us.

13 But in the District Court, they didn't say anything in their proposal
14 for a indirect or direct. Their proposal for the construction was just output
15 power compared to input power. And if I'm looking to see how efficient
16 something is, if I'm putting 100 volts in and I get 100 volts out, that's very
17 efficient. And if I put 100 volts in and get 50 volts out, that's 50 percent
18 efficient. So isn't that an indicator of what the term power efficiency would
19 mean?

20 MR. TO: With respect, Your Honor, I don't think that's correct.
21 Power efficiency depends on both the voltage and --

22 JUDGE GROSSMAN: And it's okay for you to say it's not correct
23 because the District Court said it wasn't correct also. But I just want to
24 understand where we're drawing the lines about defining things and where
25 the word indirect versus direct is going to come into play.

26 MR. TO: So let me take a step back and address the District

1 Court's construction first. The District Court is only construing the phrase
2 power efficiency. They're not putting forth a construction regarding the
3 broader phrase in response to power efficiency setting a predetermined
4 threshold.

5 Now, Petitioner's position, an interpretation of this broader phrase,
6 is that it encompasses indirect measurement. To the extent the claims
7 actually do encompass indirect measurements, such as voltage, that voltage
8 threshold still needs to somehow relate back to power efficiency. Otherwise,
9 the Petitioner is essentially proposing, rewriting the claims by omitting the
10 phrase power efficiency and adding voltage or current threshold to the
11 claims.

12 The second part of your question, Your Honor, the power
13 efficiency of a device is not just -- cannot be determined only by looking at
14 the voltage, input and output voltage. Let me point you to --

15 JUDGE GROSSMAN: And I was just using that as a simplistic
16 example. I'm not suggesting that that's what the specification or claim is
17 limited to, but it just -- it seems to fit with what they -- the defendants in the
18 District Court case, the Petitioner here -- asserted as the claim construction,
19 output power compared to input power.

20 MR. TO: Yeah. I think the distinction between output power
21 versus input power compared to output voltage versus input voltage is
22 substantial here. Power efficiency, as Your Honor just correctly stated, is
23 the ratio between output power divided by input power. You cannot arrive
24 at this ratio by only looking at -- by only comparing the output voltage to the
25 input voltage. This is because power actually depends not just on voltage,
26 but on current as well.

1 And in practice, a higher output voltage does not necessarily
2 correspond to a higher output current. In fact, Figure 1 of the '593 Patent on
3 Slide 12 actually shows that there's a nonlinear relationship between power
4 efficiency and the output current. So it's not that a higher voltage and a
5 higher output current necessarily mean there is a higher power efficiency of
6 the device.

7 Your Honor, my colleague just informed me that in District Court,
8 I think defendant actually argued that it should be a comparison that
9 encompasses indirect measurements. And the District Court actually
10 rejected that construction.

11 JUDGE ZECHER: When you get a chance, can you point us out
12 where the District Court rejected that or where it was argued?

13 MR. TO: It's on page 15 of the claim construction order of the
14 -- of their opening brief. I'm sorry, Your Honor.

15 JUDGE ZECHER: Their opening brief in District Court?

16 MR. TO: Correct.

17 JUDGE ZECHER: Okay. Is that part of the record here?

18 MR. TO: It is. I believe it's Exhibit 1037.

19 JUDGE ZECHER: 1037 is a claim construction order.

20 MR. TO: Your Honor, let me -- let us confirm --

21 JUDGE ZECHER: Yeah.

22 MR. TO: -- the exhibit number, and we'll get back to you.

23 JUDGE ZECHER: Okay. Thank you. Appreciate it.

24 MR. TO: So let me just briefly get into how the '593 Patent talks
25 about how the threshold for power efficiency is determined. So if I can
26 direct you to Slide 13, this is Figure 2 of the '593 Patent. The entire idea of

1 the '593 Patent is that you should optimize the power supply based on the
2 transmission scheme that is being used.

3 So Figure 2 on Slide 13 here actually shows the probability
4 distribution of the output power requirement for CDMA transmission
5 standard. What this is showing is that the output power requirement that is
6 most often required by a CDMA standard is a +17 dBm output power level.
7 And this is also showing that there's a maximum output power requirement
8 of +30 dBm.

9 And so if we look at Slide 14, which shows Figure 3 of the '593
10 Patent, this is showing what bias voltage and current is required by the
11 amplifier to output a specific output power level. And so by referring to
12 this, we can see that a +17 dB output power level, which as shown in Figure
13 -- sorry, Your Honor, as shown in Figure 2 on Slide 13 here, that's the most
14 probable power level, which means that's the most likely power that's
15 required from the amplifier. So it makes sense for us to optimize the power
16 supply to be most efficient where it's most likely to operate.

17 If we then go to Figure 3 on Slide 14, the most probable power
18 -- output power level of +17 dBm corresponds to a bias voltage of 1.39 volt
19 and a bias current of 100 milliamp. We then go to Slide 12 which shows
20 Figure 1 of the '593 Patent. This is showing the power efficiency
21 characteristics of the power supply. And so if we look at the figure on the
22 right on the -- right-hand side of this slide, this is showing the power
23 efficiency characteristics when the power supply is outputting an output
24 voltage of 1.3 volt, which is very, very close to the bias voltage that is
25 required by the amplifier when outputting +17 dBm.

26 So if we look at this figure, it shows you that an input voltage of

1 2.4 -- 2.7 volt is the most efficient. But we need to keep in mind that there's
2 also a maximum power output level requirement from the CDMA standard.
3 And so if we turn back to Slide 13 -- I'm sorry, if we turn back to Slide 14,
4 this shows that the power supply is required to output a bias voltage of at
5 least 3.6 volt to meet this requirement.

6 And therefore, even though on Slide 12 it shows that an input
7 voltage of 2.7 is more efficient than 3.6 volt, the '593 Patent would teach
8 you to choose 3.6 volt instead. And this is how we get to -- if you turn to
9 Slide 15 -- the power efficiency curve and power efficiency threshold that is
10 disclosed by the specification.

11 So contrary to what Petitioner represents, the specification clearly
12 tells you how to determine threshold based on power efficiency
13 characteristics. And just to illustrate this point, if you change the power
14 efficiency characteristics, the threshold will change. For example, if the
15 maximum output power level requirement is not, as we just discussed, 3.6
16 volt, but is instead 2.7 volt, then according to Figure 1, you would then
17 choose an input power supply voltage of 2.7 volt, which would change the
18 power efficiency curve shown in Figure 6 and also the threshold for
19 activating the bypass switch in this diagram as well.

20 I think if you look at -- if you turn to Slide 17, which shows
21 Petitioner's reply argument, this is really the upshot of what Petitioner's
22 construction is trying to do here. What they argue here that -- is irrelevant
23 that the threshold involves power efficiency determination. It is also
24 irrelevant that the threshold is set based on reason that has nothing to do
25 with power efficiency.

26 If you continue to Slides 18, according to Petitioner, all that

1 matters is that a function is activated. They then pay lip service to the claim
2 language. And the function that is activated is based on voltage. That's all
3 is required according to Petitioner. This completely reads out power
4 efficiency from the claims.

5 JUDGE GROSSMAN: Does it read it out? Or is it possible that
6 there are various ways that you can calculate efficiency? And what you've
7 outlined in your presentation and in the specification is one way of
8 measuring efficiency. But there may be other ways of measuring efficiency.

9 And the claim doesn't define how you measure efficiency. It just
10 says, whatever way you want to figure it out, what -- that at a certain level of
11 efficiency that you identify that as a threshold. And that's all that the claim
12 requires is some action in response to a threshold based on power efficiency.
13 And doesn't that allow someone to figure -- use -- you've given a preferred
14 embodiment of efficiency and as you've identified that column 4 of the
15 patent.

16 But there I think can be other ways that someone might calculate
17 efficiency. And that seems to be okay under the claim. The claim would
18 -- tries to encompass every possible way of calculating efficiency. But you
19 didn't disclose every possible way.

20 So you're looking at a -- when you say plain and ordinary meaning,
21 does that lock me into the specific power efficiency calculations that you've
22 run through with your charts from the patent that require that I do it the way
23 you've explained? Or would someone who calculates efficiency differently,
24 would that also fit within the plain and ordinary meaning of power
25 efficiency?

26 MR. TO: Thank you, Your Honor. You're correct that the claim

1 does not limit -- it's not limited to a specific way of calculating power
2 efficiency. But I think the key here is that power efficiency needs to be
3 calculated somehow. What Petitioner is proposing is that because the
4 preferred embodiment shows a voltage threshold, it doesn't matter how you
5 get to that voltage threshold. That voltage threshold, as in the prior art, can
6 be based on hardware limitation that has nothing to do with power
7 efficiency.

8 All that matters is that you're looking for voltage threshold or
9 current threshold, if it's there, it meets the claim. Under this interpretation,
10 you're reading out power efficiency because it doesn't matter what the -- how
11 the threshold is set. Does that answer your question?

12 JUDGE GROSSMAN: Yes, thank you.

13 MR. TO: I would like to get into the specific unpatentability
14 grounds. I'll start with Ground 1A, which involves Hau in combination with
15 Yoshida. Turning to Slide 22, Petitioner argues that Hau's power
16 determination signal Pdet -- sorry, power detector signal Pdet is an indicator
17 of power efficiency because Pdet is proportional to the output voltage of the
18 power supply VCC2.

19 This is wrong for a couple of reasons. If you can turn to Slide 23.
20 As a threshold matter, Pdet is generated based on an RF signal. It is not
21 generated based on any DC power. As shown on this slide, the RF signal
22 path in blue is completely separated from the DC power signal path in red.
23 This is confirmed by Dr. Ricketts in his report, paragraph 110.

24 And the distinction between RF power and DC power seems to be
25 recognized by Petitioner's expert, Dr. Larson, as well when he clarified that
26 under his construction of power efficiency, which wrongly omits ratio. The

1 input power that he refers to, as he clarified, needs to be DC input power and
2 not RF input power.

3 JUDGE ZECHER: Mr. To, just for the benefit of Judge Ahmed
4 who's online, can you pronounce the slide numbers you're on so he can
5 follow along?

6 MR. TO: Sorry, Your Honor. I was on Slide 25. But I will now
7 turn to Slide 26. So Petitioner's argument that P_{det} , even though it really is
8 determined based on RF input power, it nonetheless discloses, it is an
9 indicator of power efficiency is based on this linear relationship that is
10 established between P_{det} and V_{CC2} . And as shown on Slide 26 here, those
11 two are shown in blue.

12 JUDGE GROSSMAN: Does P_{det} -- is it some indicator of power
13 efficiency? Now, I appreciate the distinction between the RF input and the
14 battery input, and those are different. But is the P_{det} measurement also an
15 efficiency measurement of some sort? But it's measuring an input signal, the
16 RF signal efficiency, and it's just getting at efficiency in a different way.

17 And so that -- as I think as we were discussing earlier, that it's not
18 exactly the same way that it's disclosed in the preferred embodiment, but it's
19 a way of calculating an efficiency. It does it differently. It has an RF input
20 rather than a battery input. But there's a person of ordinary skill would
21 understand that either calculation could result in something that you would
22 identify as a power efficiency.

23 MR. TO: Yes, Your Honor. To the extent P_{det} is an indicator of
24 anything, it would be an indicator of the RF output signal of the first stage
25 amplifier. I think this is important to make this distinction here, that the
26 power efficiency that we're referring to in the claim, as expressly provided

1 by the claim language, is the power efficiency of the power supply.

2 It is not this overall system efficiency nor is it the efficiency of the
3 power amplifier. There's no evidence on the record suggesting this. But to
4 the extent Pdet can be used to determine -- it indicates any power efficiency,
5 the closest thing might be the efficiency of power amplifier one that has
6 nothing to do with the power efficiency of the power supply, which is what
7 is at issue here.

8 So the only way to -- for Petitioners to get from Pdet to the power
9 efficiency of the power supply is by relying on this relationship between
10 Pdet and VCC2. VCC2 is the output voltage of the power supply.
11 According to Petitioners, VCC2, based on -- Pdet, based on this relationship
12 of VCC2, indicates power efficiency because the battery voltage Vbatt is
13 fixed. This is simply not true.

14 If you turn to Slide 28. You'll see that in order to calculate power
15 efficiency of the power supply, in addition to knowing VCC2 in blue and
16 Vbatt in red, you also need to know the input and output current of the
17 power supply indicated in green. As I mentioned earlier, if you refer to
18 Figure 1 of the '593 Patent, that teaches you that the output current is not
19 linear related to the power efficiency. So you really can't tell what ICC2 and
20 Ibatt is doing in this figure.

21 Again, Petitioner's argument with respect to Hau is that, well, Hau
22 discloses a voltage threshold and that's the same as what is in the preferred
23 embodiment of the '593 Patent. As I explained earlier, that's not how the
24 '593 Patent discloses a series of power efficiency consideration in order to
25 get to the output voltage -- the voltage threshold.

26 If you turn to Slide 30, this is another critical distinction between

1 Pdet -- the Pdet threshold in Hau and the power efficiency threshold in the
2 claim. The claim requires that the threshold be set based on power
3 efficiency.

4 Okay. This is Slide 30, if I did not mention that. As I was saying
5 that the claims require a threshold set based on power efficiency. This is not
6 what is happening with the Pdet threshold and Hau. Hau discloses that the
7 Pdet threshold is actually set based on the operating range of the power
8 supply.

9 If you turn to Slide 31, Dr. Ricketts explained this. So in Hau, you
10 -- the power supply needs a voltage differential of 0.4 Volt, meaning that if
11 the output voltage and the input voltage is less than 0.4 Volt, the power
12 supply in Hau actually does not operate properly. And because of this
13 reason, Hau teaches you to set a voltage threshold at 3 Volt so that when
14 you're getting close to and at the compliance threshold, you would bypass
15 the power supply. Because if you go any higher, the power supply is not
16 going to function or not function as expected.

17 This is not a power efficiency threshold. This is a hardware
18 limitation threshold. If you turn to Slide 32, Petitioner also argues that
19 Figure 5 in Hau can somehow be used to, quote, "ascertain -- or
20 ascertainable power efficiency." This, again, is false. If you look at Figure
21 1 of Hau, the power out in Figure 5 refers to the RF power output shown in
22 blue. And the Ibatt in red corresponds to the battery current shown in red on
23 this slide. It is Slide 32, if I did not mention it.

24 Again, this only tells you the overall system efficiency. It doesn't
25 tell you anything about the efficiency of the power supply, which relates to
26 VCC2 and ICC2 in green -- shown in green on the figure on the right side of

1 this slide.

2 I'll turn to some of the dependent claims on Slide 33. It shows that
3 the Dependent Claim 2 requires deactivate the switching device based on the
4 load current at the output voltage node. Petitioner actually admits that Hau
5 uses voltage measurement to control the bypass switch. But their position is
6 that because the relationship between power voltage and current is known by
7 the Wellman formula, power equals to voltage times current, that would
8 have been obvious to use current measurement instead. This is not true in
9 the context of Hau.

10 First of all, I'll just briefly mention that Hau teaches away from
11 using current measurement to control its circuit. Actually, on Slide 34, Hau
12 talks about numerous downsides of using current measurements. And if you
13 turn to Slide 35.

14 JUDGE ZECHER: Mr. To, can you go back to Slide 34? It seems
15 to me like this discussion in Hau is based on the background of the
16 invention. It's actually talking about prior art patents that Hau is referencing,
17 not exactly Hau's disclosure of the invention itself. So I'm a little curious
18 how you arrived at a teaching away here when it's just kind of giving you
19 this general background information.

20 MR. TO: Your Honor, the background is a set up to what Hau
21 actually discloses, which I will get into in Slide 35. But we agree that the
22 disclosure shown on Slide 34 is the background information. But it is
23 relevant to what comes after and this is showing how setting up its invention
24 and its improvement over the prior art.

25 So if we turn to Slide 34. And Your Honor, this is actually what
26 -- when Hau discloses how its invention works. If you can look at the

1 paragraph on the right side of Slide 35, Hau tells you that the current
2 consumption optimization is achieved by establishing a linear relationship
3 between P_{det} , V_{CC2} , and V_{in} -- and the part about V_{in} is shown on the left
4 side of the paragraph.

5 Hau went on to say that the prior art relies on the P equals to $(I)(V)$
6 power relationship to control the power supply, whereas the present
7 invention relies on the V_{CC2} squared over R power relationship. So if I can
8 turn your attention to Slide 36. Modifying Hau such that P_{det} is based on
9 current measurement is not a simple substitution as Petitioner argues. It's
10 actually a complete overhaul of Hau's circuit and it destroys the linear
11 relationship that Hau depends on to achieve its current optimization.

12 As you can see on Slide 36, which shows an annotated version of
13 Figure 1. The linear relationship between V_{in} in green, P_{det} in blue, and
14 V_{CC2} in red is what gives Hau its optimization. What Petitioner is
15 proposing is that you're going to swap out -- it's unclear -- it's just unclear
16 what Petitioner is proposing here. But to the extent we can understand it, it
17 seems like they're saying you can base P_{det} instead of V_{in} , base it on V_{CC2}
18 in purple.

19 As I mentioned, this is destroying the linear voltage relationship
20 between V_{in} , P_{det} , and V_{CC2} . And it also involves changing the circuit that
21 is shown in Hau, which involves connecting the output power of the power
22 amplifier to a power detector. It seems like if we swap it out for current
23 measurement at the low -- at the output voltage node, you would have to
24 change that configuration -- circuit configuration.

25 In the interest of time, we're going to stand on our briefing for
26 Dependent Claims 5 and 11. I'll just quickly note for Dependent Claims 6

1 and 12, which is shown on Slide 40, Claim 6 and 12 requires a comparison
2 of the down-converted input voltage to a threshold voltage.

3 If you turn to Slide 41. Petitioner's position is that the Pdet
4 threshold meets this claim limitation because Pdet is related to VCC2. The
5 claims are quite clear and plainly requires comparing the down-converted
6 voltage to a threshold. It doesn't set comparing something related to the
7 down-converted voltage to a threshold. And Petitioners admit that Pdet does
8 not equal VCC2.

9 And as shown in Figure 1 on Slide 41, Pdet and VCC2 are actually
10 on two completely separate signal paths. So Petitioners here, again, is
11 relying on the indirect measurement theory. The claim language is clear
12 here. It requires comparison of the down-converted voltage to a threshold,
13 and that is not Vbatt.

14 Moving on to Ground 1B, which involves the combination of Hau
15 in view of Yoshida in further view of Sahu. Petitioner asserts that certain
16 dependent claims are rendered obvious by this combination.

17 Turning to Slide 43. Specifically, according to Petitioner, a
18 POSITA would have considered Sahu's teaching that the performance of the
19 power supply should be optimized based on the most probable power output
20 level at which the device is likely to be operated as instructive for optimizing
21 the performance of a power supply taught by Hau. This is the motivation to
22 combine that is preferred by Petitioners. This motivation to combine fails
23 because a POSITA would not have found any teaching in Sahu that would
24 be useful in improving the circuits of Hau or Yoshida.

25 If you turn to Slide 44. What Sahu actually teaches are three fairly
26 simple things: one, Sahu observed that for CDMA systems, power supply

1 operates mostly at 15 to 20 dB back-off. And because of this fact, Sahu
2 teaches you that it is important when evaluating the efficiency of a power
3 amplifier to use what Sahu refers to as a weighted average efficiency.

4 By using this weighted average efficiency calculation, Sahu shows
5 that a dynamic power amplifier is more efficient than a fixed power
6 amplifier at back-off voltage. What Sahu doesn't teach is how to improve
7 the weighted average efficiency of a power supply other than using a
8 dynamic power amplifier. What that means is if you calculated -- if you
9 calculate the weighted average efficiency of a power supply and you find the
10 efficiency to be unsatisfactory, the only improvement you can get out from
11 Sahu is to swap out whatever you have with a dynamic power supply.

12 In the case of Hau and Yoshida, both of them already uses a
13 dynamic power supply. And therefore, Sahu doesn't offer any further
14 improvement to Hau and Yoshida's circuits. Turning to Slide 47. So in this
15 figure, Sahu shows you the weighted average efficiency calculation of a
16 dynamic supply compared to a fixed supply. Petitioner is relying on these
17 two figures to do some heavy lifting here. What Petitioner wants you
18 -- wants us to believe is that a POSITA would look at these two figures and
19 equate Hau's single circuit to two separate and unrelated circuit disposed in
20 Sahu. We believe this is just pure hindsight.

21 And if you turn to Slide 48. As I mentioned earlier, there is no
22 express teaching in Sahu as to how to improve the weighted average
23 efficiency other than using a dynamic PA.

24 Turning to Slide 51. Here, Dr. Ricketts in paragraph 175 of his
25 report explain why a person of skill in the art would not have equated Sahu's
26 implementation of a dynamic supply to the circuits. The two separated the

1 circuits in the Hau and Yoshida device.

2 As Dr. Larson admitted during deposition, Hau -- Sahu does not
3 disclose a bypass circuitry at all. I might return to some of the other
4 dependent claims on the Hau grounds if I have time later. But I would like
5 to turn to the Canyon grounds.

6 So for Ground 2A, Petitioner proposed modifying Canyon in view
7 of Ranjan such that Canyon's bypass switch will be controlled based on the
8 efficiency plots in Ranjan. This motivation to combine is -- fails for several
9 reasons.

10 So turning to Slide 57. There is no motivation to combine Canyon
11 and Ranjan as shown in Figure 1A of Ranjan and Figure 1 of Canyon.
12 These are very different looking circuits. And Counsel earlier argued that
13 there's -- this is not sufficient just because the circuits look different does not
14 mean that a POSITA would not have looked to Ranjan in modifying
15 (PHONETIC) Canyon.

16 And Counsel specifically referenced the fact that Ranjan is
17 referenced by Canyon in the patent. This is a misrepresentation of Patent
18 Owner's position. We're not saying that you're not -- a POSITA would not
19 look to Ranjan. We're saying that a POSITA would not look to Ranjan in
20 the manner that Petitioner proposes.

21 What Petitioner proposed is this -- if you turn to Slide 58. Again,
22 similar to how Petitioner uses Sahu, Petitioner is essentially relying on
23 Figure 3 of Ranjan, which shows the efficiency plot of the DC-to-DC
24 converter system disposed in Ranjan compared to a constant VDD. What
25 this figure in Ranjan is showing is the efficiency of Ranjan's invention. This
26 so-called crossover point that Petitioner wrongly asserts that Ranjan teaches

1 is not in Ranjan at all.

2 And if you look at the figure on the right side of Slide 58, the red
3 line and the red circle and the word threshold is added by Petitioner or their
4 expert. This is just pure hindsight. This is looking at what the '593 Patent
5 teaches and backtracking it by using Ranjan and expert testimony.

6 Turning to Slide 59. So there are two different separate
7 embodiments in Canyon, there's a Figure 1 embodiment and a Figure 2
8 embodiment. How to set the threshold for the bypass switch is actually
9 disclosed in connection with Figure 2. Now, if we look -- if we turn to Slide
10 61. These two embodiments are quite different, to say the least. In the
11 Figure 2 embodiment, there is a power meter that the -- that is connected to
12 the output of the power amplifier. Whereas for the Figure 1 embodiment of
13 which Petitioner relies on in disclosing the challenge claims, there is no such
14 power meter at the output of the power amplifier. They said --

15 JUDGE ZECHER: Mr. To, is it your position that these are
16 mutually exclusive embodiments even though they share many of the same
17 elements?

18 MR. TO: This is not Patent Owner's position. Patent Owner's
19 position is that these two separate embodiments -- it's not clear how the
20 Figure 2 embodiment's way of controlling the threshold can be applied to
21 Figure 1. And our position is that the Petitioner is deficient in this regard
22 because it did not explain how. And Petitioner cannot meet their burden
23 simply by throwing their hands in the air and saying that, look, they're kind
24 of similar. So a POSITA would know how to do it. They need to explain it
25 in particularity as required by rules.

26 JUDGE ZECHER: When you say explain, are we talking about

1 the bypass 190? Is that what we're talking about specifically?

2 MR. TO: No. Specifically, what we are talking about is that in the
3 Figure 2 embodiment, the threshold is set based on the output power of the
4 power amplifier. Now, in Figure 2, that number is actually measured. In
5 Figure 1, however, that is not measured.

6 And if I can point you to Slide 63. Dr. Ricketts actually explained
7 why this is problematic. It's because the output power of the power
8 amplifier actually depends not only on the bias voltage but also on the gain
9 of the power amplifier and the power level of the input RF signal.

10 So by only looking at the bias current -- we can go back to Slide
11 61. If we're only looking at the bias current as measured by the power meter
12 in Figure 1, it's unclear how we can arrive at the output power of the power
13 amplifier where our position is not that -- you know, there isn't some way
14 that this can be done. Our position is that Petitioners should have explained
15 this in the petition and they failed to do so.

16 We point this out and they're now trying to say that, well, no, a
17 POSITA will know how to do this. It's too late, Your Honor.

18 JUDGE GROSSMAN: So are you suggesting, Mr. To, that the
19 Petitioner's burden there is -- well, those two figures basically have the same
20 components. The real difference is they move where the power meter is
21 located in the circuit. But a person of ordinary skill wouldn't see those and
22 say you adjust them as you need it for a particular circuit. Those are all the
23 elements. You've got a bypass. You've got all the other -- the only
24 difference is where you're going to put your power meter. And you can put
25 it wherever you want.

26 MR. TO: Well, the difference is actually more significant than

1 that. Even though Canyon described in Figure 1 power meter as a power
2 meter, Dr. Larson admitted during the deposition, what is actually measured
3 there is not power but current. We can see this by how the power meter is
4 connected. What is being measured there is the current -- the output current
5 of the power supply and not output power and certainly not the output power
6 of the power amplifier, which -- as shown in Figure 2, if you want to do that,
7 you would connect it to the output of the power amplifier instead.

8 And I would reiterate that there is no clear way how these two can
9 be -- how the output power of the power amplifier can be determined based
10 on the bias current alone. So a POSITA would need more information than
11 just the output current to determine that. And the petition is completely
12 silent on how this is done.

13 Put differently, Your Honor, there are -- no matter how minor, we
14 would -- Patent Owner do not think that the differences are minor. But there
15 are differences between Figure 1 and 2. And the petition did not explain
16 how these differences are relevant to the analysis. And the petition also did
17 not explain how the method of determining the threshold can be applied -- in
18 connection with Figure 2 can be applied to Figure 1. We can't just draw
19 assumptions based on something that is not in the petition.

20 JUDGE ZECHER: So you're focused more on the lack of
21 explanation than you are kind of the interrelationship between these two
22 embodiments.

23 MR. TO: That's right. And the burden is on the Petitioner to do
24 so.

25 JUDGE ZECHER: Understood. Thank you.

26 MR. TO: If I can point you to Slide 62, Your Honor, this is the

1 relevant testimony from Dr. Larson that I mentioned earlier clarifying that
2 the -- even though in Figure 1, it refers to element 180 as power meter, it
3 really is measuring current and not power.

4 Turning to Slide 64. Dependent Claims 3 and 10 requires that the
5 switching device be controlled based on a probable output power point of
6 operation for a selected modulation scheme based on one or more power
7 efficiency characteristics. Turning to Slide 65. This is just a more egregious
8 version of what Petitioner did with respect to independent claims. As I've
9 mentioned earlier, the red threshold and the so-called crossover point and
10 that is shown in the figure annotated by Petitioner is not in Ranjan.

11 And to assert that Ranjan discloses Dependent Claims 3 and 10,
12 they just draw -- they just follow the straight line down to the probability
13 curve and drew what they refer to as the probable output power point of
14 operation. As Dr. Ricketts explained, the threshold in red is not determined
15 based on power usage probabilities, this instead, based on a comparison of
16 the measured efficiency between amplifier with constant VDD and DC-DC
17 converter.

18 If we turn to Slide 66. It seems like Petitioner realized that the
19 original theory is untenable. And so on reply, it seems like Petitioner
20 changed theory with respect to these claims. If I can point you to the --

21 JUDGE GROSSMAN: Those are just on the dependent claims
22 that we're talking about now?

23 MR. TO: That's right. This is Dependent Claim 3 to 4, 10, and 19,
24 Your Honor. So as shown at the top of Slide 66 in the petition, what
25 Petitioner is pointing to as the probable point of -- the probable output power
26 point of output power is what they drew on Slide 65, which is the light blue

1 circle. Going back to Slide 66, at the bottom of Slide 66, it seems like on
2 reply, Petitioner is now changing their position to say that the likely point of
3 operation is the peak of the curve.

4 Petitioner's position on this is not a model of clarity. But to the
5 best of Patent Owner's understanding -- if you turn to Slide 67 -- the original
6 position refers to a point on light blue, whereas the reply is referring to the
7 peak shown in green. Your Honors, I would just use the last few minutes of
8 my time to reiterate, the claims -- what the claims require is the power -- is a
9 predetermined threshold that is determined based on power efficiency. This
10 is not what is in the power as we have -- as you've seen based on our
11 discussion earlier.

12 In Hau, the voltage threshold -- the Pdet threshold is set based on
13 hardware limitations of Hau's circuit. It has nothing to do with power
14 efficiency, nor could it be used to determine the power efficiency of the
15 power supply.

16 I think throughout the petition, Petitioner seems to be confusing
17 the power efficiency of the power amplifier, the overall system efficiency
18 and what is actually relevant here, which is the power efficiency of the
19 power supply. With respect to Canyon as well, what Canyon discloses is the
20 output power. The threshold is set based on the output power of the power
21 amplifier and not the power efficiency of the power supply. These are
22 meaningful distinctions and the claim language specifically requires it to be
23 the power efficiency of the power supply.

24 With that, I'll reserve the rest of my time for rebuttal. Sorry, Your
25 Honor, there's one last thing. As promised, the place where defendant in the
26 District Court case argued the indirect measurement is Exhibit 1034 at page

1 19.

2 MR. CHARKOW: And just to be clear, it's -- that's in the record.
3 That's our brief that cites to what they said is the only thing in the record that
4 quotes what they say. And basically, quotes, "Exhibit --

5 JUDGE ZECHER: Yeah. Mr. Charkow, I don't disagree that they
6 argued that. I guess more what -- I was looking for was a citation where the
7 District Court judge affirmatively rejected that position.

8 MR. CHARKOW: I guess our point is they argued that when they
9 made their arguments about their claim construction, their claim
10 construction should be the output power of the power supply compared to
11 the input power. When they made that argument, they said that includes this
12 concept of indirect measurement. That was part and parcel of their
13 construction.

14 When the Court came to a construction and we said, Your Honor,
15 plain and ordinary meaning, it's just the ratio, that was our argument. The
16 Court went with plain and ordinary meaning, which was our construction,
17 where we argued it's just the ratio and rejected whatever was built in to their
18 construction. So yes, I don't think I could point to the Court said, you know,
19 I'm rejecting this.

20 But in adopting our position and the arguments that went into each
21 position, they specifically -- it's not like they didn't talk about indirect
22 measurements was part of their construction. They specifically talked about
23 that. And then the judge said, nope, I'm going with the plain and ordinary
24 meaning, which was our argument that talks about the ratio.

25 So what I'm saying, it's not like the concept of -- what I was just
26 wanted to make clear, it's not like this concept of indirect had no -- that the

1 Court -- District Court had no concept that this -- that they wanted to put
2 indirect into it. They argued it very vehemently. We opposed it. And we
3 talked about it back and forth. And you can see that in Exhibit 1034 and
4 1035.

5 And my point being is that the Court considered that -- the Court
6 rejected that position -- and for reasons Mr. To was saying, had good reason
7 to reject that position. Because there has to be somebody -- it can't just be
8 indirect because that's just vague. And they could pack any prior art, say,
9 oh, indirect. Okay, well, we see voltage, you just pack anything into that.
10 And so that was the point that Mr. To was just trying to --

11 JUDGE ZECHER: Okay. I understand your position. Thank you.

12 MR. CHARKOW: Okay.

13 JUDGE GROSSMAN: Before you leave the podium then should
14 we take away from that when you said that they adopted your construction,
15 you argued the ratio as the plain and ordinary meaning. And the District
16 Court judge in the order just used the phrase plain and ordinary meaning. So
17 does that mean that -- what that means is the plain and ordinary meaning is
18 the ratio that you argued in your District Court brief?

19 MR. CHARKOW: Yes. I think the Court took the constructions
20 into consideration and the judge wasn't just saying, oh, it's any plain and
21 ordinary meaning. We were the ones that argued plain and ordinary meaning.
22 We put a very specific discussion around that. And we said, look -- and our
23 expert in this case, Dr. Ricketts, said, listen, it's just the ratio. It's Vin, it's
24 the ratio of power in power - what's the ratio? Power in, power out, and
25 that's it. And that's what we argued.

26 And the judge said plain and ordinary meaning. So he could have

1 rejected our position. He could have said something else. He could have
2 said plain and ordinary meaning means something different than what we
3 said. But he just adopted our position wholesale.

4 JUDGE ZECHER: Not to beat a dead horse here, but other than
5 the ratio, is there any other daylight between defendant's proposed
6 construction and the plain and ordinary meaning? It's otherwise the same,
7 correct?

8 MR. CHARKOW: Well, the language "compared to" --

9 JUDGE ZECHER: Yeah.

10 MR. CHARKOW: -- like, when you put something over
11 something, I guess abstractly, it's compared to something. But "compared
12 to" opens it up to this vague world of anything goes. And that's why in this
13 case you have this situation where they're pointing to all -- Mr. To explained
14 all this prior art and like, it's not right.

15 JUDGE ZECHER: Well, to be fair, the District Court used
16 "compared to." They said it's simply the ratio of the output power of a
17 component as compared to its input power. That's what they said.

18 MR. CHARKOW: Yeah. But that's a ratio.

19 JUDGE ZECHER: Yeah.

20 MR. CHARKOW: But it's -- they want the other side -- MediaTek
21 wants to be beyond that, well beyond that.

22 JUDGE ZECHER: I understand your position. But I'm just
23 asking, do you see much difference other than the ratio term?

24 MR. CHARKOW: Right. But the "compare to" is a big issue.
25 Like, the actual --

26 JUDGE ZECHER: What's being compared?

1 MR. CHARKOW: Right. What's being compared --

2 JUDGE ZECHER: Understood.

3 MR. CHARKOW: -- if you open that up, it's anything.

4 JUDGE ZECHER: Okay.

5 MR. CHARKOW: And that's what they're using then to jam all
6 the prior art into this case.

7 JUDGE ZECHER: Understood. Thank you.

8 JUDGE GROSSMAN: Before you leave, I just --

9 MR. CHARKOW: Sir?

10 JUDGE GROSSMAN: I want to clarify my understanding of it,
11 that in the District Court's order at the very end of the analysis, where the
12 District Court said, these are my constructions, the District Court identified
13 that the defendant's proposed construction had the three -- four columns: the
14 term, plaintiffs proposed, defendants proposed, court's final.

15 MR. CHARKOW: Yeah.

16 JUDGE GROSSMAN: The defendants proposed was the output
17 power compared to the input power. And I think that's what I understood
18 you say that's what the ratio means. We're just comparing input and output
19 --

20 MR. CHARKOW: Well, that --

21 JUDGE GROSSMAN: -- whether you put one as a numerator and
22 one as a denominator, they -- and they seem to say the same thing.

23 MR. CHARKOW: That construction is broader. And that's why I
24 believe the Court rejected it. That's why the Court didn't just go with plain
25 and ordinary meaning as compared to that. Because when you say
26 comparison, you open it up into all sorts of comparisons, not just ratios, it

1 could be a comparison of anything.

2 And that broad comparison is what the other side is relying on to
3 get in all their prior art. This huge -- like, if you compare it, it could be
4 compared to anything. And you don't even have to be restricted to power.
5 Like, you heard, the - pointing to voltage and current, things that have
6 nothing to do with power efficiency. That's how they're getting all this prior
7 art in is by relying on this vague concept of comparison.

8 And matter of fact, during claim construction, that's why they say,
9 it could be this indirect comparison. So it could just be the voltage. It
10 doesn't have to be the power. But that's an indirect comparison. But that's
11 not what the patent talks about. The patent talks about power efficiency.
12 And that's what the prior art has to show. And the prior art doesn't show.

13 Mr. To explained that today. The prior art doesn't even come close
14 to that. It talks about voltages that have nothing to do with power efficiency.
15 It talks about current that has nothing to do with power efficiency. And then
16 they try to go to prior art and they try to say, oh, here's our expert. And our
17 expert says, oh, it's related, and you can combine it.

18 That's not what the patent says. The patent's very clear with what
19 it says. It says power efficiency, everything, all the thresholds, everything
20 needs to be tied to power efficiency. And they have not shown any of that.

21 Anything else, Your Honor?

22 JUDGE GROSSMAN: Okay. No, thank you.

23 JUDGE ZECHER: Ten minutes left.

24 JUDGE GROSSMAN: I know.

25 JUDGE ZECHER: Yes. You got it right. I'll put hers on. It's 12.

26 JUDGE GROSSMAN: We have you as 12 minutes rebuttal time.

1 MS. KAISER: I'll try to use less.

2 JUDGE ZECHER: Okay.

3 MS. KAISER: But there was a lot baked into that -- I have a
4 number of points to make on rebuttal. First, the District Court -- and then
5 this is in Exhibit 1037, page 35 -- didn't reject the idea of indirect
6 measurements of power efficiency. What the District Court said was how it
7 was measured is outside the scope. So, you know, I think everything else
8 about what we argued is true, that we did make those arguments in District
9 Court similar to what we've made here. But the District Court didn't resolve
10 that issue in going with plain and ordinary meaning.

11 The other thing that I would note is I didn't hear Mr. To or Mr.
12 Charkow argue that you have to compare an actual measured or calculated
13 power efficiency during operation of the power supply to a threshold. So
14 what that -- if you look at their claim construction briefing, that's not in there
15 at all. That's not what they're arguing. They're trying to tie power efficiency
16 in a different way to say that's how you set the threshold. And that's not
17 what's claimed.

18 So if you look at the specification for the '593 Patent, every
19 example of comparing something to a threshold is not comparing the actual
20 calculated power efficiency, not comparing a ratio to a threshold. There's no
21 sort of comparing 50 percent to 50 percent. And you trigger the bypass if
22 you're at 51 percent. That's not in the '593 specification at all.

23 And so that's why what we're talking about here is an indirect
24 measurement. Because what the '593 Patent does talk about is having a
25 voltage threshold, having a current threshold, and then comparing in
26 operation those parameters which are indirect indicators of power efficiency

1 to the threshold.

2 JUDGE ZECHER: Ms. Kaiser, how would you respond to their
3 argument that when you map to this claim limitation in dispute for Claim 1,
4 in response to power efficiency of a power supply exceeding a
5 predetermined threshold, that when you talk about power efficiency it's not
6 directly tied to a power supply? How would you respond to that?

7 MS. KAISER: So Your Honor, I think that it is -- and it seems to
8 me that the big disconnect in what Mr. To argued is that all of their slides
9 -- and this didn't fully resonate with me until I heard the argument. But all
10 of their slides are pointing to Hau Figure 1, which is a complete different
11 embodiment than what the petition relies on, which is Hau Figure 6.

12 And I'll just point you to petition pages 16 to 17, 22, 24, 29, and
13 31, all referring to Hau Figure 6. And you'll see that in our slides refers to
14 Hau Figure 6. And so my understanding is, for example, the separate paths
15 argument that Mr. To made when he was up here, really, only applies to
16 Figure 1. And that's not what the petition is relying on.

17 In addition, if you look at our Slide 46 -- do we have our slides?

18 MR. CANAVERA: I think it's off.

19 JUDGE ZECHER: Well, we have it in front of us.

20 MS. KAISER: You have it in front of you. If you look at our
21 Slide 46. I think there was an argument that Mr. To made that you can't
22 calculate power efficiency from Figure 5. And this was where he made an
23 argument that this was about the system efficiency instead of the power
24 supply efficiency. But Pout is based on VCC2, as you can see in the legend
25 here.

26 And if you look at Figure 6, not Figure 1, VCC2 is the output of

1 the power supply, not the output of the system. And so VCC2 to which Pdet
2 is directly related, as I discussed earlier, is correlated to the output of the
3 -- or the power efficiency of the power supply, not the system.

4 If we go to Slide 51 -- this is Petitioner's Slide 51. Mr. To also
5 made an argument about how setting a threshold based on the operating
6 range, but that's exactly the same as what the '593 Patent's example does. So
7 you see here Figure 3 of the '593 Patent, it gives an operating range between
8 the 1.39 Volts -- this is the call out to the right -- and 3.6 Volts. And then it
9 sets the threshold at 3.6 Volts, which is the maximum voltage. So the
10 disclosure in Hau is essentially the same as what's in the '593 Patent.

11 If we look at -- I just wanted to also quickly mention Claim 6. So
12 if we go to Slide 57. So Mr. To said essentially that in our mapping that we
13 were comparing the wrong thing because what is being compared is not the
14 actual down-converted voltage but is related to the down-converted voltage.

15 But again, that's exactly the same as what is in the '593 Patent.
16 Figure 5 of the '593 Patent doesn't compare the output voltage, V-out to the
17 threshold. It compares the OSVC to the threshold, which again is related to
18 V-out. So again, it's where the prior art is disclosing exactly the same thing
19 as what the patent is disclosing.

20 Going back to the claim construction issue, just very briefly. Mr.
21 To talked a lot about -- and if -- this is on Patent Owner's Slide 16 that talked
22 a lot about sort of trying to correlate -- to piece together Figures 1 through 3
23 of the '592 -- or '593 Patent to read in this idea of setting the threshold based
24 on power efficiency and sort of came up with this non-disclosed
25 embodiment.

26 And I just want to point the Board to our Slides 32 and 33. This

1 was a new argument from ParkerVision in the sur-reply. And our Slides 32
2 and 33 explain why that argument doesn't make sense, why it's essentially
3 comparing apples and oranges in terms of trying to piece these figures
4 together, which is something that the '593 specification never does.

5 And then I guess just to close out -- and then I'll turn it over to Mr.
6 Canavera for a few points on the Ground 2 -- on Patent Owner's Slide 5, this
7 was where Patent Owner pointed to things in the '593 specification that
8 talked about power efficiency. But these are just generic background
9 disclosures about power efficiency. And I wanted to point out to the Board
10 that there's nothing in these disclosures that's about a threshold or comparing
11 these power efficiencies to a threshold.

12 So with that, I can turn over to Mr. Canavera so he can talk about
13 the Canyon-based grounds.

14 MR. CANAVERA: Good afternoon, Your Honors. I'll hit very
15 briefly a few points for the Canyon grounds. First of all, I'll note it sounded
16 like ParkerVision is -- was confirming that when asked about the claim
17 construction issues that something like this do not impact the Canyon
18 grounds. I think the comment was that they -- the claim construction
19 impacts at least the first set of grounds. I take that to mean it doesn't impact
20 Canyon, which would be our understanding as well.

21 On Slide 58, ParkerVision said that this was hindsight on our part
22 to show where those two lines cross each other on the right-hand side from
23 Figure 3 of Ranjan. It's not, for two reasons. First of all, we did draw those
24 lines and wrote that word threshold. But there's no hindsight here for at least
25 two reasons, one is a person skilled in the art is able of seeing where two
26 lines cross each other, their power efficiency lines.

1 They can see where they cross each other on a graph. We just
2 drew that. More importantly, Canyon is the one that tells us explicitly in
3 column 4, the point in which you're going to trigger that bypass circuit is at
4 high power levels, right? And it --

5 JUDGE GROSSMAN: Is that Slide 56 of their slides?

6 MR. CANAVERA: This is ParkerVision's Slide --

7 JUDGE ZECHER: Fifty-eight.

8 MR. CANAVERA: Fifty-eight, yeah. So it's Canyon that tells us
9 that it's at a high-power level that you need to activate the bypass circuit.
10 And then in particular, it gives an example of 22 to 24 dBm. But again,
11 what -- for a particular implementation, Ranjan shows us how do I find that
12 high-power level? You can use a chart, just like a person of ordinary skill
13 can. You can see where those two efficiency lines cross.

14 Let's go to Slide 81 of our slides. On this issue about Figure 1 and
15 Figures 2 in Canyon, I -- it sounded like ParkerVision is agreeing, these are
16 not mutually exclusive. But I heard them to say that was not the case. And
17 what they wanted was more explanation of the petition about how the
18 disclosure of Figure 2 gets used with the Figure 1 from Canyon.

19 To clarify, there are two steps that they are -- or there are two
20 requirements for their argument, neither of which is satisfied. Let me just
21 bear that out. First of all, they would have to be right, that portion of column
22 4, starting at line 14, only describes Figure 2. They're sort of assuming that
23 in their argument. As I addressed in my initial argument, that's not right.

24 That would only be the case that somehow Canyon forgot to
25 describe bypass switch 190 in Figure 1. That's not the case. It's clear
26 enough from that description that does describe Figure 1. No further

1 explanation was necessary. So that's the first part of the requirement they're
2 setting which is not met.

3 Number two is even if that were right, they want some explanation
4 about how this threshold of 22 to 24 dBm could be used in Figure 1 of
5 Canyon. Again, nothing else was necessary because Canyon told us that in
6 column 3, lines 20 down to 30, said, measuring the current as done in Figure
7 1 gives you a corresponding power value. KN (PHONETIC) itself connects
8 those two diagrams. There wasn't anything extra that was needed in the
9 petition to make that connection.

10 Unless you don't have any further questions, I will take a seat.
11 And we ask that you find the claim is unpatentable. Thank you.

12 JUDGE GROSSMAN: Judge Ahmed, any further questions? So
13 Mr. To, we've got that you calculated it at 10 more minutes left for your
14 rebuttal.

15 MR. TO: Thank you, Your Honor. I'll start by responding to
16 Petitioner's argument that the District Court claim construction did not reject
17 their indirect measurement construction. It is true that the District Court has
18 held that how the power efficiency is measured is outside the scope of the
19 claim. This is consistent with what Patent Owner just argued, which is that
20 the claims does not require specific way power efficiency is calculated.

21 What the claims does -- do require is power efficiency. The
22 threshold needs to relate to power efficiency somehow. To the extent
23 Petitioners is correct that indirect measurements is encompassed by the
24 claims, they still need to show how those indirect measurements bears on
25 power efficiency. They have not done that.

26 They pointed to a voltage threshold and then pointed to the

1 preferred embodiment in the '593 Patent to argue that, well, because there's a
2 -- because the '593 Patent in one embodiment shows a voltage threshold, this
3 is all that is required. And in doing so, they ignored the '593 Patent's
4 disclosure regarding how you arrive at that output voltage threshold.

5 JUDGE GROSSMAN: But in the District Court's order -- I think
6 I'm going to read it. It's in that Exhibit 1037 and it's on page 35. I think the
7 District Court specifically said how power efficiency is measured is outside
8 of the scope of the term power efficiency. The last two words, I added. But
9 the sentence is defendants -- or how power -- the sentence is how, quote,
10 "power efficiency," unquote, is measured is outside of the scope of the term,
11 period.

12 So the District Court seems to say that it doesn't matter how you
13 determine power efficiency. You can do it any way you want. And that's in
14 the paragraph labeled third paragraph on page 35 of 38 of the District
15 Court's order, talking about the defendants -- which would be the Petitioners
16 in our case -- defendant's proposed construction reflects the plain and
17 ordinary meaning and saying how you do it is outside the scope of the claim.

18 The claim doesn't require any specific methodology. It just
19 requires that you come up with some ratio or relationship but not -- it doesn't
20 matter how you get there. And if voltage is a valid indicator or any other
21 valid indicator would -- could be a measure of power efficiency.

22 MR. TO: I believe the first part of Your Honor's question is
23 consistent with what opposition -- which is that the claim does not specify
24 any particular manner in which power efficiency is measured. What the
25 claims do require is that power efficiency is somehow reflected in the
26 threshold. Your Honor, in the later part of your question, you mentioned

1 that voltage can be an indicator of power efficiency.

2 Dr. Larson admitted that voltage alone is not -- is neither a
3 comparison of output power to input power nor an indicator of power
4 efficiency. So to the extent voltage can reflect power efficiency in some
5 way that the Petitioner did not show how the voltage in the prior art can do
6 that. In contrast, the '593 Patent actually tells you how a voltage can reflect
7 power efficiency.

8 As I've mentioned earlier, there is a complex and innovative
9 process in looking at the transmission scheme of the power amplifier and
10 then determining what the bias voltage is required and then optimizing the
11 bias voltage and then setting a threshold based on that optimization. This is
12 what the '593 Patent describes. These are absent in the prior art. The prior
13 art sets the threshold based on hardware limitations or unspecified reason
14 relating to the output power of the power amplifier and not the power
15 supply.

16 So Petitioner also argued that the '593 Patent, like the prior art, sets
17 the threshold based on the operating range. That is not true as -- for similar
18 reasons as I described earlier. What the threshold depends on is not the
19 operating range of the hardware. What it depends on is the transmission
20 scheme and the corresponding power efficiency optimization configuration
21 that would result based on the transmission scheme of the system.

22 Moving on to Petitioner's argument that Hau discloses the same
23 thing as the '593 Patent regarding claim 2, which requires comparing a
24 down-converted voltage to a threshold. Petitioner here, again, is trying to
25 limit the claims to the preferred embodiment shown in the '593 Patent. The
26 claim language is clear. It requires comparing the down-converted voltage

1 to a threshold.

2 And in fact, the specification actually discloses this very similar
3 language where you compare the output voltage of the power supply to a
4 threshold. So the specification talks about this. They're just pointing to the
5 preferred embodiment in the figures saying that here's the output voltage
6 -- here's the voltage threshold and this is what the power does. For the same
7 reason I've mentioned a couple of times now, the '593 Patent is not as simple
8 as that.

9 There's a whole process that leads up to arriving at the output
10 voltage. And you also can't use what's in the specification to change the
11 plain -- what the plain language of the claim requires, which is a down-
12 converted voltage compared to a threshold.

13 That said, the specifications description is consistent with the claim
14 language in this regard. Petitioner also argued that the Figure 6 embodiment
15 of Hau somehow is different from the more simplistic figures that we relied
16 on in our slides to argue that -- to argue Hau's deficiencies. Petitioner didn't
17 really point out anywhere where, like, Figure 6 resolves any of the
18 deficiencies that we mentioned.

19 And what Figure 6 is -- does is the same as what we pointed out,
20 which is that the Pdet signal is generated based on the RF power input. And
21 it's unrelated -- and it's on a completely different signal path compared to the
22 power supply output voltage. And the only thing that ties the two together is
23 the relationship between Pdet and VCC2. That stays true with regard to
24 Figure 6.

25 Moving on to Canyon, Petitioner argued that the issue with respect
26 to Figure 1 and Figure 2 of Canyon is -- only applies if the bypass switch

1 disclosure -- it is true that the bypass switch-related disclosure only applies
2 to Figure 2. That's not true. Even if we assume that the bypass switch
3 disclosure applies to Figure 1, it -- there's no wholesale application of that.

4 As I explained earlier, that disclosure talks about output power of
5 the power amplifier. There is no direct -- there is no measurement of output
6 power -- of the power amplifier in Figure 1. Petitioner still needs to -- even
7 if we assume -- and we do not concede this point. But even if we assume
8 that is the case that the disclosure with respect to the bypass which can be
9 applied to Figure 1, Petitioner still did not explain in the petition how that
10 can be applied.

11 And additionally, they are still pointing to the output power of the
12 power amplifier, which is not what the claim requires. The claim requires
13 the power efficiency of the power supply, which is different from the output
14 power of the amplifier.

15 Petitioner argued that we made a new argument on sur-reply. I
16 believe, Petitioner is referring to the example that I provided earlier
17 regarding how changing the maximum output power requirement of the
18 power amplifier changes the power efficiency curve and the threshold.

19 JUDGE GROSSMAN: Mr. To, we're going to give you a little
20 leeway here, but wrap up pretty quickly.

21 MR. TO: Okay. Thank you, Your Honor. This is the last point
22 I'm going to make, everything that was set in that example is a logical
23 extension and is fully supported by Dr. Ricketts' testimony that was
24 submitted in connection with our Patent Owner response. We are simply
25 pointing out an example, which is completely consistent with the -- Dr.
26 Ricketts' testimony in response to Petitioner's argument that the threshold

1 wouldn't change depending on power efficiency. Thank you, Your Honor.

2 JUDGE GROSSMAN: Okay. With that, the case will be

3 submitted. And we will adjourn this proceeding and go off the record.

4 (Whereupon, the above-entitled matter went off the record at 4:22

5 p.m.)

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