

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LG ELECTRONICS, INC.,
Petitioner,

v.

CONSTELLATION DESIGNS, LLC,
Patent Owner.

IPR2023-00319
Patent 10,693,700

Record of Oral Hearing
Held: April 17, 2024

Before BRENT M. DOUGAL, MICHAEL T. CYGAN, AND
SCOTT RAEVSKY, *Administrative Patent Judges*.

IPR2023-00319
Patent 10,693,700

APPEARANCES:

ON BEHALF OF THE PETITIONER:

USMAN KHAN, Ph.D.
W. KARL RENNER
JEREMY MONALDO
PATRICK DARNO
Fish & Richardson, P.C.
1000 Maine Ave SW Ste 1000
Washington, DC 20024
(202) 626-6383 (Khan)
khan@fr.com
axf-ptab@fr.com
jjm@fr.com
darno@fr.com

ON BEHALF OF THE PATENT OWNER:

WILLIAM MEUNIER, ESQ.
MICHAEL RENAUD, ESQ.
KEVIN C. AMENDT, ESQ.
Mintz, LLP
One Financial Center
Boston, MA 02111
617-348-1845 (Meunier)
WAMeunier@mintz.com
mtrenaud@mintz.com
keamendt@mintz.com

The above-entitled matter came on for hearing Wednesday, April 17, 2024, commencing at 9:20 a.m. MST, at the Denver, Colorado, USPTO Regional Office/via Video-conference.

P R O C E E D I N G S

- - - - -

9:20 a.m.

JUDGE DOUGAL: Good morning. So, first of all, we apologize for the delay. I'm informed there was some mix-up on the court reporter. Generally, we would have the court reporter right here in person. We apologize that that did not happen today. But we have a court reporter online.

Because of that hiccup, we will need to be a little more cognizant of the fact the court reporter is not here in person. Try to maybe talk a little slower. And that also means that they don't have, or I'm sure they're probably getting them, the demonstratives and the other things, but they may not be as up-to-speed as our usual court reporters. So, just let's keep that in mind.

So, I'll do our official start now.

Good morning. I'm Judge Dougal. I have with me Judge Raevsky, and then, on the screen here is Judge Cygan. This is IPR 2023-00319 between LG Electronics, Incorporated, and Constellation Designs, LLC.

I hope everybody's in the right place.

Okay. So, let's start with appearances. So, yes, Petitioner on this side and Patent Owner. So, who do we have for Petitioner?

(Off-microphone comments.)

JUDGE DOUGAL: Great.

Patent Owner?

1 MR. MEUNIER: Good morning, Your Honors. My name is Bill
2 Meunier from Mintz. I'm here with Kevin Amendt, also from Mintz, on
3 behalf of Constellation Designs, the Patent Owner.

4 Thank you.

5 JUDGE DOUGAL: All right. I'm getting the message that maybe
6 your microphone wasn't on. So, I don't think they heard you. So, do you
7 want to repeat?

8 MR. KHAN: Good morning, Your Honors. My name is Usman
9 Khan. I'm here with my colleagues Jonathan Driesslein, Jeremy Monaldo,
10 and Karl Renner from Fish & Richardson.

11 JUDGE DOUGAL: Thank you. And that was Petitioner.

12 Okay. Obviously, as we just experienced, Judge Cygan and our court
13 reporter will hear you if you speak into the microphone. Generally
14 speaking, you're going to be at the podium right at the microphone. So, it
15 won't be an issue. But just make sure that it's on.

16 As you likely know, even though we have the demonstratives here, we
17 also have them at our computers and have reviewed them. We have the
18 entire file. But make sure to say the slide number that you're on, so
19 everyone can follow along, and it makes for a better transcript.

20 Let's see, we've got 45 minutes of time for each side today. Petitioner
21 will start first. All right. Because we had this 15-20 minute delay, I want to
22 confirm whether anyone has any problems with flights or other time
23 constraints that might cause a problem.

24 Petitioner?

25 MR. KHAN: No concerns from Petitioner.

26 JUDGE DOUGAL: Okay. Patent Owner?

1 MR. MEUNIER: Since we're starting now, I think we're okay.

2 JUDGE DOUGAL: Okay, okay. Good. Okay. Good. Let's see.

3 With objections, we ask that you not object during the presentation of the
4 other party's argument. Please save those until your time.

5 Petitioner, would you reserve any time for rebuttal?

6 MR. KHAN: I'd like to request 15 minutes, please.

7 JUDGE DOUGAL: Okay. Great. It's already set up.

8 And, Patent Owner, you can decide at your time, but do you have a
9 general idea of what you're thinking right now? Do you want a rebuttal?

10 MR. MEUNIER: Right now, I probably will just save 5 minutes,
11 Your Honors.

12 JUDGE DOUGAL: Okay. Okay. Any questions?

13 (No audible response.)

14 JUDGE DOUGAL: I just wanted to confirm that everything's
15 working out with the court reporter. But I guess, for our people online, I
16 don't know if the court reporter can talk to us or message us, but I just want
17 to confirm that he or she can hear us and is recording everything and not
18 having any issues.

19 (Off-the-record comments with the court reporter.)

20 JUDGE DOUGAL: I guess we'll wait a few minutes. You're free to
21 speak among yourselves, or whatever.

22 (Pause.)

23 JUDGE DOUGAL: All right. Let's go ahead.

24 Yes, Petitioner, do you want to come up to the podium and get ready?
25 And when you're ready, let me know. I do have a couple of questions to get
26 things started with. All right.

1 (Pause.)

2 JUDGE DOUGAL: People are typing messages.

3 Okay, I think we're good. I think we're good. So, we'll go ahead and
4 start.

5 One thing that I don't know we've really talked about yet in the
6 briefing, I just want to clarify, is the question of, who has the burden to
7 establish written description support, or the lack thereof, and what that
8 burden is?

9 So, I'll start off with those questions, and we can proceed whenever
10 you are ready.

11

12 DR. USMAN: Okay.

13 JUDGE DOUGAL: And obviously, if that's not a question that
14 you're prepared to talk about your colleagues in the back can think about it
15 and look to the papers and we'll talk about it later too.

16 DR. USMAN: Thank you, Your Honors. If it may please the Board,
17 before I begin can I just check in if my voice is clear? Being heard by
18 everyone?

19 (No audible response.)

20 DR. USMAN: Thank you. Your Honors, I'll start with maybe
21 addressing your question, and then proceeding with some talking points.

22 If we can turn to Slide 5 please. In the briefing we mentioned a few
23 cases. This is the Indivior v. Reddy's Labs case. What this case specifies is
24 that the written description requirement requires a statement of the
25 invention. And that the disclosure must be clear and unambiguous.

1 In fact, the, yes. The patent must demonstrate that the inventors had
2 possession of the invention. It must demonstrate that. Now, it is generally
3 upon the Petitioner to show that there is a lack of written description
4 support. And once Petitioner has offered arguments then it is on the Patent
5 Owner to rebut those arguments.

6 And what we see in this case, and also in the Lockwood case, is that
7 the requirement is not one of conjecture. That a inventor may have
8 possessed this. It is that there must be clear description of the claimed
9 features being supported.

10 And as noted here, it is denying invitation for hunting, for a hunting
11 license or a search expedition where a reader is required to go through
12 different parts of the disclosure and patch together the claimed invention. It
13 should be clear, it should be unambiguous. And I hope to show you today in
14 our discussion that that is simply not the case here. There is no written
15 description support.

16 If I can continue? Did I answer your question?

17 (No audible response.)

18 DR. USMAN: Thank you. Slide 2 please. Your Honor's, today I
19 would like to address the following issues. These issues generally relate to
20 whether or not the 777 patent provides adequate written description support,
21 as we just discussed, for Claims 5, 15 and 25. I'll generally be discussing
22 Claim 5, but the arguments apply to Claims 15 and 25 as well.

23 In today's presentation I will address the different theories that Patent
24 Owner has provided for alleged written description support of the challenged
25 claims. The first theory is that the description in 777 patent of optimized 1D
26 constellations that are then orthogonalized to form 2D constellations

1 allegedly provide support for Claim 5. We'll call this the orthogonalization
2 theory. And this is addressed in Issue 1.

3 The second theory is that the 777 patents disclosure of optimizing
4 over each degree of (indiscernible) for each dimension, provides sufficient
5 support. The second theory is addressed in Issue 2.

6 The third issue is related to a requirement in the claims for a non, for
7 each of the non-uniform multidimensional constellations to have a greater
8 parallel decoding capacity than other constellations at the same SNR. We
9 will discuss how both experts agree that Claim 5, how they agree that Claim
10 5 would have been implemented and how these disclosures simply miss
11 them with this 777 patent.

12 Then to Issue 4. We will discuss some of the serious problems in
13 Patent Owner's expert declaration and why it should be given less weight
14 relative to Petitioner's evidence.

15 In addressing these issues, Your Honors, it will become apparent that
16 Patent Owner's arguments rely on the omission of key clear terms, such as
17 multidimensional in their analysis and their notes. And that the Patent
18 Owner relies on an assumption that the capacity characteristics of a one-
19 dimensional constellation, and of multidimensional constellations, are the
20 same. This is simply not true.

21 Moreover, the record reflects that the Patent Owner has not provided
22 any evidence of the assumption being true, whereas the Petitioner has
23 provided various pieces of evidence, including the testimony of both experts,
24 explaining why this is (indiscernible) correct.

25 Can Your Honors please turn to Slide 8? Before we dig into the
26 issues, I thought it would be very helpful to revisit the claim language

1 because it's critical here. Claim 5 depends from Claim 1. It generally
2 recites various limitations related to a communication system that has a
3 receiver, and this receiver is using a non-uniform multidimensional symbol
4 constellation pairs. And that these plurality of non-uniform
5 multidimensional symbol constellations must have the same number of
6 points.

7 Claim 5, as you can see here, further specifies that in the plurality of
8 different non-uniform multidimensional constellations, which according to
9 Claim 1 are the same number of points, each one of these non-uniform
10 multidimensional symbol constellations must be capable of providing a
11 greater parallel decoding capacity that is specific to SNR, that is significant
12 to this issue, than other constellations at the same SNR.

13 Let's briefly summarize what is required by Claim 5. One, non-
14 uniform multidimensional symbol constellations. And I emphasize
15 multidimensional because as you will see, Patent Owner often glosses over
16 this requirement.

17 Two, that each of these constellations has a greater parallel decoding
18 capacity of particular SNR compared to all the other constellations at the
19 same SNR. As we go to show you today, none of these features are
20 described in the 777 patent.

21 If Your Honors could turn to Slide 12 please. In the POPR the Patent
22 Owner had argued that Figures 11B, 13B, 15B and 17B allegedly support
23 Claim 5. As noted in Slide 12, Your Honor is pointing to Patent Owner's
24 statements and preliminarily agreed with Patent Owner. Note however, that
25 in all of these statements the word multidimensional is missing. This was

1 not a coincidence. This is because they use 11B, 13B, 15B and 17B, are all
2 related to one dimensional constellations.

3 Patent Owner programmatically, and incorrectly, pointed to one-
4 dimensional constellations as allegedly providing support for claim capacity
5 characteristics of multidimensional constellations. As (indiscernible) are
6 required in Claim 5.

7 Now the record has since developed, and plenty of evidence is now at
8 the disposal of Your Honors. Petitioner believes this evidence clearly
9 establishes the error in Patent Owner's theories of written description
10 support. And why these challenge claims are ultimately not entitled to
11 priority in the 777 patent.

12 And to briefly recap, pre-institution in response to the petition Patent
13 Owner offered two theories of why Claim 5 is supported. Again, these two
14 theories are covered in Issue 1, Issue 2. It's also noteworthy that Patent
15 Owner offered only attorney arguments in the Patent Owner response, they
16 did not collaborate their positions by any expert evidence at the time of the
17 Patent Owner response.

18 And if Your Honors would please turn to Slide 16. Patent Owner's
19 theory is derived from the disclosure shown on the right slide here, Slide 16.

20 The passage explains that when you orthogonalize a 1D constellation, such
21 a PAM-8 constellation, one can construct a 2D constellation, such as a
22 QAM-64 constellation, as shown in Figure 21 on the left.

23 Which by the way, is the only figure in the patent that depicts a 2D
24 constellation. PO, the Patent Owner, then combines this disclosure with
25 Figures 11B, 13B, 15B, 17B. Again, a hunting expedition. They combine
26 this disclosure with some other disclosure in the patent and say, well, these

1 figures describe optimized 1D PAM constellations. And so when you
2 orthogonalize them into 2D constellation, voila, you have optimized 2D
3 constellations.

4 JUDGE DOUGAL: So, this is Judge Dougal. How are we supposed
5 to deal with the statements in your petition and your own expert testimony
6 when, for example, you said at Paragraph 135, constellations of Figures 11B,
7 13B, 15B, 17B are one-dimensional PAM constellations, however, the 777
8 patent explains that one-dimensional geometric PAM constellations can be
9 optimized into multidimensional QAM constellations?

10 Provides a cite to the 777 patent. So it seems to be that your expert
11 admitted that, consistent with what we found in the DI, that the 777 patent
12 teaches optimizing these PAM constellations, well his words are, optimize
13 into multidimensional QAM constellations.

14 DR. USMAN: Thank you, Your Honor, for giving me the opportunity
15 to clarify that. So the optimized in that sentence refers to the PAM
16 constellations, not the multidimensional constellations. I think what he was
17 trying to say there was that you can optimize the PAM constellations and
18 four multidimensional constellations. That disclosure is there. We don't
19 dispute that. That disclosure is there.

20 But to say that the multidimensional constellations are themselves
21 optimized is not the case. And I think we tried Dr. Hochwald in subsequent,
22 in their second declaration and tried to clarify that.

23 And I think we will discuss the statement where he tries to make that
24 clear. That yes, you can have optimized PAM constellations, you can use
25 the prior optimized PAM constellation to create multidimensional

1 constellations. But that does not mean the multidimensional constellations
2 themselves are optimized.

3 Why is that important? Because when you look at Claim 5, Claim 5
4 actually requires that we are dealing with the parallel decoding, the parallel
5 decoding capacity, and the SNRs, all the multidimensional constellations not
6 those of 1D constellations. And in subsequent evidence I'll prove to you, we
7 have third-party evidence as well that suggests that when you have 1D
8 constellations, it actually doesn't suggest it explicitly shows, you have 1D
9 constellations that are optimized to form 2D constellations, they will look
10 different than what a 2D constellation optimized in multidimension looks
11 like.

12 JUDGE CYGAN: Counsel, this is Judge Cygan. Can you explain
13 what it means in the description on your slide that says the capacity
14 characteristics of the two-dimensional are identical to the, to those of the
15 one-dimensional PAM?

16 Why should we not draw from that that, you know, the teachings
17 from, or the description from 13B, which is the PAM, which we relied on
18 earlier in the institution decision, why aren't those same characteristics being
19 drawn from the two-dimensional based on that statement?

20 DR. USMAN: Thank you very much. That was actually my next
21 talking point. So that sentence is essentially what Patent Owner hangs its
22 hat on. It says look, it says, the capacity characteristics of QAM and PAM
23 are identical.

24 What they didn't pay attention to, and what is critical, and what we
25 will show you in subsequent slides, are the last five words of that sentence.
26 Says, on a per dimension basis.

1 So what it's saying is, when it looked at a QAM in one dimension on
2 per dimension basis, it has the same capacity characteristics. Yes, it has the
3 same capacity characteristics because you're looking in one dimension. And
4 we'll show you that in subsequent slides.

5 If Your Honors could, and this actually is, this is the fundamental flaw
6 in their theory. And we'll show you why it's not true. If Your Honors could
7 turn to Slide 13 please.

8 So on Slide 13 Dr. Hochwald, he explains that the disclosure in the
9 777 patent provides information about the capacity characteristics in one-
10 dimension, not the capacity characteristics of multidimensional
11 constellations. He explains that when 2D QAM constellations are formed by
12 or orthogonalizing 1D PAM constellations, the capacity characteristics on a
13 per dimension basis, 1D, that's 1D, may be the same. But the capacity
14 characteristics over multidimensional constellations are not necessarily the
15 same.

16 They explained this, and this is shown actually better in Slide 14. If
17 Your Honors could turn to Slide 14. You will notice that this phrase, on a
18 per dimension basis, is found throughout the specification. Here is showing
19 you various different snapshots of the disclosure in the 777 patent. Each one
20 of them says, on a per dimension basis.

21 Why is that important? Because the patent, and this is reflected in the
22 figures, their patent is all about PAMs. And they have the throw away
23 statement about, yes, you can generate QAMs and PAMs. The capacity
24 characteristics that are discussed in the 777 patent are related to one-
25 dimensional characteristics.

26 JUDGE RAEVSKY: Counsel --

1 DR. USMAN: If Your Honors could turn to Slide 17.

2 JUDGE RAEVSKY: Counsel, before we go there. This is Judge
3 Raevsky. Is Dr. Hochwald's testimony supported by citations other than
4 Fuentes or is that the sole basis upon which he bases his statement in Slide
5 13?

6 DR. USMAN: I think Dr. Hochwald, I'm sorry, and Slide 13 you
7 said?

8 JUDGE RAEVSKY: Yes.

9 DR. USMAN: Give me one second please.

10 (Pause.)

11 DR. USMAN: So I can double check this particular point. My
12 understanding is, Dr. Hochwald's position, regarding this particular
13 understanding, is based on a few different, first of all, he has decades of
14 experience in this field. And he has indicated, and in fact we will show you
15 that the SNR and how well we put in capacities. In fact, even the patent
16 itself says that the (indiscernible) the spacing between constellation
17 (indiscernible) is different from multidimensional and one-dimensional
18 constellations.

19 And I think we have a slide that points to them. I'm happy to give
20 that slide number too. So I think as (indiscernible) is not just based on the
21 Fuentes reference, it's based on experience, based on what the patent
22 features. And in addition is (indiscernible.)

23 JUDGE RAEVSKY: Thank you.

24 DR. USMAN: You're welcome.

1 JUDGE CYGAN: Counsel, this is Judge Cygan again. Before we
2 leave Slide 13, can you talk a little bit about why Claim 5 requires it to not
3 be on a third-dimension basis?

4 DR. USMAN: Yes. In fact, if we can turn to Slide, uh, go down
5 please. That shows Claim 5. Yes.

6 Your Honor, as we'll notice here that --

7 JUDGE CYGAN: I'm sorry, which slide is that?

8 DR. USMAN: Sorry. This is Slide 8.

9 JUDGE CYGAN: Slide 8? Thank you.

10 DR. USMAN: You'll notice here that the words, on a per dimension
11 basis, are missing. You will notice here that the word one-dimension is
12 missing. What you see here repeated is the word multidimensional. And at
13 the end you can also clearly see that it says, the multidimensional symbol
14 constellations at the same SNR.

15 The claim is directed to the capacity characteristics of
16 multidimensional constellations. Those characteristics are not the same in
17 one dimensional constellations.

18 JUDGE CYGAN: Just to clarify that. If multidimensional is
19 clarifying the single constellation, it's not characterizing the characteristics
20 you're getting from them, correct?

21 Claim 5 requires a greater capacity I'm not sure that I see where it
22 requires the capacity to be not on a one, not on a per dimension basis. Can
23 you talk about that a bit?

24 DR. USMAN: Yes. Because what Claim 5 is saying is that you're
25 comparing the parallel decoding capacities of each of the plurality on

1 multiple, each of the different non-uniform multidimensional symbol
2 constellations with other multidimensional symbol constellations.

3 The comparison is of a capacity characteristic of multidimensional
4 constellations. And this capacity characteristic is not the same in 1D as it is
5 in 2D.

6 JUDGE CYGAN: Well, let me explain a little bit how my thinking is
7 going. And I'll give you a chance to weigh in on this. So if we're starting
8 with the PAM-8 constellation, that certainly seems to meet it for one-
9 dimensional. Showing that it's different for different values.

10 Then we have the teaching that the capacity characteristics are
11 identical. Which means that on a per dimension basis it's going to meet the
12 claim limitation. Why isn't it sufficient for the claim that on a per
13 dimension basis one of those, each of those different multidimensional
14 constellations is capable of providing a parallel, a greater parallel decoding
15 capacity on a per dimension basis at a specific SNR? Why can't that be on a
16 per dimension basis is my question?

17 DR. USMAN: Because I think there is two issues with that. The first
18 is that we're inserting the words on a per dimension basis, which are not
19 found in the claim. As we showed in that last slide, Slide 14, that phrase is
20 littered throughout the specification, but it was not part of the claim. Which
21 means they intentionally did not put it in part of the claim. Right?

22 And secondly, why is it important? It's because the very thing that
23 you're referring to, the parallel decoding capacity and the SNR, that is
24 different for 1D than it is for 2D. And so what, essentially in order to arrive
25 at that place where you're saying, you have to do two things. First you have
26 to insert these words into the claims. And then you're essentially comparing

1 a different entity. You're comparing characteristics that are different than
2 what have been actually claimed in Claim 5.

3 JUDGE CYGAN: So in your first point are you advancing the scope
4 of written description argument that it might satisfy it in a per dimension
5 basis for that portion of it, but on a more generic meaning of it, it doesn't
6 satisfy it on a more generic reading of it?

7 DR. USMAN: No, Your Honor. What I'm saying is the claim does
8 not recite on a per dimension basis. What it recites is parallel decoding
9 capacities of multidimensional constellations. And it also says, at the SNR
10 of multidimensional constellations.

11 How can we compare how will decoding capacity in one dimension
12 with SNRs in multidimensions? That doesn't make sense. And so, if we
13 start inserting words and start assuming this might be what is meant by the
14 claims, we end up in no man's land essentially. That's not what the claim is
15 about.

16 And maybe with the limited time I would like to jump ahead to a
17 figure that perhaps shows this very clearly.

18 (Pause.)

19 DR. USMAN: Yes. If Your Honors could turn to Slide 29. Slide 29,
20 this is the Fuentes reference. This is not something Dr. Hochwald came up,
21 this is a third-party reference.

22 What we see in the center is a QAM constellation, 64-QAM
23 constellation, that has been orthogonalized in one dimension. And then,
24 sorry. That has been optimized in one dimension and then orthogonalized to
25 create a 2D constellation. We see that in the center.

1 And you can see the spacing in 1D, in the two dimensions being
2 essentially the same. Right?

3 What you see on the right side is a QAM constellation that has been
4 optimized in two dimensions. And the Fuentes reference explains what's the
5 difference. But when you optimize in two dimensions you can relax the
6 spacing requirements. That allows more flexibility and better optimization.

7 Fuentes reference even explains that you'd almost never go with what
8 you see in the middle because the SNR and the capacity factors, when
9 optimized in 2D, are significantly better than what you see in 1D.

10 JUDGE RAEVSKY: Counsel, this is Judge Raevsky. Where does
11 the claim require optimizing in multiple dimension?

12 DR. USMAN: So, Your Honors, Petitioner does not believe that the
13 claim requires optimization. The reason we're talking about this is because
14 Patent Owner presented these theories as written description support.

15 In their Patent Owner response they said, there are two theories here
16 that provide support. One, orthogonalization. Two, which unfortunately we
17 haven't got to yet, is optimizing over multidimensional constellations. I'm
18 sorry, optimizing over multiple dimensions each (indiscernible.)

19 In our Petitioner reply we even go on to address the problems with
20 these, with the optimization theories, right? With this orthogonalization of
21 1D to 2D. Relying on the fundamental assumption that the characteristics of
22 1D and 2D are the same. They're not. The Fuentes reference shows you
23 that they're not the same.

24 The claim is directed to LDPC, SNRs, are multidimensional
25 constellation, not one. Even their own expert, when we discussed this figure
26 they said, yes, we actually refer to what you see in the middle, we refer to it

1 as a 1D constellation. That's why in the caption you actually see it's being
2 referred to as 1D. Why? Because the capacity characteristics performance
3 are essentially the same as 1D. That's not a multidimensional constellation.

4 In the second theory is, in the second theory there is ten lines of
5 description. And the ten lines talk about how complicated it is. This, when
6 you optimize, when you go from one dimension to two dimensions the
7 complexity just, you know, it's exponential.

8 When we asked their own expert they said, and this is, we can show
9 you Slide 26. If you can turn to Slide 26. We asked the expert, well, you
10 know, can you explain to us what this additional complexity said? Well it's
11 going to take a lot of time, right? It's very difficult to explain.

12 None of that disclosure is part of the 777 patent. So what we see, the
13 reason we're talking about optimization is because these were the theories
14 presented by Patent Owner. They're not correct, they're not right. They're
15 wrong. We're not saying optimization is required, but they're pointing to
16 the support, we're trying to explain that support isn't sufficient, it misses the
17 point.

18 They're going to try to say that, well, we're reading optimization to
19 the claims. No we're not. What we're saying is, actually we're saying the
20 opposite. Because optimization is not sufficient. Like the description of
21 optimization that you provided here, that doesn't teach a person, that does
22 not show a person of ordinary skill in the art that you have possession of
23 this.

24 What it's requiring you to do is to try to, and one other point here.
25 The experts, the Patent Owner's expert, and we show this in slide, yes, Slide
26 37. Patent Owner's expert, the POSITA standard that he uses to provide his

1 statements was out of a PhD. Right? That's not the POSITA standard that's
2 used in these proceedings.

3 Why? Why? Well it's because they're actually requiring a much
4 higher level of expertise and trying to insert that knowledge into the patent
5 because it's clearly not there. And then saying, yes, a POSITA would have
6 understood this. No, a POSITA wouldn't have understood that. Right?

7 What you're trying to do is trying to make up for a lack of written
8 description support that's just not there. And let's just say --

9 JUDGE CYGAN: Counsel, this is Judge Cygan.

10 DR. USMAN: I'm sorry?

11 JUDGE CYGAN: Counsel, this is Judge Cygan.

12 DR. USMAN: Yes.

13 JUDGE CYGAN: I have a question for you on your slide. That's
14 your assertion of ordinary skill in the art, correct?

15 DR. USMAN: On the top left side is the --

16 JUDGE CYGAN: Right.

17 DR. USMAN: -- standard that has been agreed upon in the institution
18 decision, was presented in the petition.

19 JUDGE CYGAN: And doesn't that standard say that superior
20 education can compensate?

21 DR. USMAN: Yes, it does.

22 JUDGE CYGAN: So doesn't that sort of bring into play PhD level
23 education?

24 DR. USMAN: It's possible, Your Honors. But what that standard
25 does not do, for instance, when you're looking at the standard used by Patent

1 Owner is it doesn't show you what a persons with a master's degree would
2 have understood, right?

3 What essentially their, their re-definition is of a person of
4 extraordinary skill in the art, not ordinary. And mind you, they did not
5 present any definition of their own. They did not --

6 JUDGE CYGAN: Honestly I don't think that's being reflected on
7 your slide. You're showing us your assertion, which was agreed to, that you
8 could have superior education, and then you have the testimony. Or at least
9 the discussion from the surreply, which is a PhD and possibly some years
10 after PhD. That seems to be certainly very close to, you know, superior
11 education compensating for a deficiency in work experience. I don't see that
12 this is supporting this claim.

13 DR. USMAN: I'm sorry, which point is that?

14 JUDGE CYGAN: That the evidence that you're showing on the slide
15 shows some degree of superior education, which is beyond what you
16 propose for a person of ordinary skill.

17 DR. USMAN: Yes, I think the point, Your Honors, I was trying to
18 make, perhaps we did not communicate as clearly, is that the written
19 description, the clear description that is required, right, to claim priority,
20 that's not there. Right? It's just not there.

21 Regardless of which standard you might use, it's just not there. But
22 what you see on the Patent Owner side is a reliance in this high-level skill.
23 And we can dispute about whether that's efficient or not, but it's consistent
24 with a pattern basically of, and maybe I can, I'm sorry, I've exceeded my
25 time, can I have a few more minutes?

26 (No audible response.)

1 DR. USMAN: Thank you. Maybe, I'd like to say a few things.
2 When you look at the patent and the claims, what you see is, Figure 21 is the
3 only figure with a multidimensional constellation. You see a discussion of
4 optimizing PAMs and orthogonalizing them.

5 But when you look at Claim 5 it requires essentially determining that
6 each of the multidimensional constellations has a greater parallel decoding
7 capacity. I will ask Your Honors to go through the entire spec and find one
8 example where they might show a QAMs constellation that's compared with
9 another QAM constellation. And that there is a discussion of the parallel
10 decoding capacity for the SNR of these QAM constellations.

11 JUDGE RAEVSKY: Counsel, this is Judge Raevsky. I just, I know
12 we're in your rebuttal time, that comparison is my question. Why does
13 Claim 5 require a comparison?

14 I know you have on Slide 32 information from the experts. Is there
15 anything else that you're basing your implicit claim construction of a
16 comparison on?

17 DR. USMAN: Yes. Your Honors, this ties in a little bit with the
18 question you asked earlier about optimization. It's not our position that
19 there is necessarily a comparison or optimization part.

20 Now, what the experts have told us, and in fact, Patent Owner's expert
21 indicated, how does this stuff work? Well, you have a system that has a
22 bunch of constellations, right? And in order to determine that the
23 constellation that is being selected or used, that it has a greater parallel
24 decoding capacity than all the other constellations that are stored in this
25 library, in the receiver essentially, that you'd have to do some sort of
26 comparison. Right? Those are his words, right?

1 Our expert also, he mentioned that, and we mentioned this in the
2 petition. And what you find again is that there is no disclosure of
3 comparison. There is zero disclosure of a comparison of multidimensional
4 constellations in the patent.

5 And I apologize for going over my time. If you have any other
6 questions I'm happy to answer. Thank you, Your Honors.

7 JUDGE RAEVSKY: Thank you.

8 JUDGE DOUGAL: And so, you'll have about 11 minutes on your
9 rebuttal.

10 (Long pause.)

11 JUDGE DOUGAL: So do you still want five or do you want --

12 MR. WILLIAM: Why don't we change it to like eight.

13 JUDGE DOUGAL: Eight minutes, okay.

14 (Laughter.)

15 MR. WILLIAM: (Inaudible.)

16 JUDGE DOUGAL: All right, whenever you're ready.

17 MR. WILLIAM: Thank you. I'm ready, Your Honors. I'm going to
18 switch things up a little bit and probably jump around more than I hope to in
19 (inaudible) all at times.

20 And I'm saying that because, and I will address the burden question
21 you had, but there is a lot of moving parts here on. There are a lot of
22 statements that were made in the petition that are now being contradicted.
23 There's (inaudible) petition that are being dropped. The (indiscernible)
24 being addressed to are not only new for the five, but some of them are new
25 to the surreply that they requested.

1 So there's a lot to cover here. And I think probably the best way to do
2 it is for me to take a step back and kind of methodically go through the
3 history here. And maybe even more importantly, methodically go through,
4 what does the patent actually say? What has their expert and our expert said.

5 And probably, I'm not going to say most importantly, but the Fuentes,
6 it's not a reference, and it's not prior art, it's years after this. It's
7 acknowledging the inventiveness of what's in this patent. But it confirms
8 everything that we've been saying about what's in the patent. And it refutes
9 their points about what's one dimensional, what's multidimensional.

10 So I apologize, I'm probably going to be skipping around a lot. And
11 if I'm missing what, something is important you guys obviously, I'm going
12 to assume you're going to let me know. But so, for the burden of proof I'll
13 confess, I didn't look at a bunch of cases before this hearing because I
14 thought it was kind of understood at this point, but it's certainly my
15 understanding that the burden is on the Petitioner since they are the ones
16 challenging the validity. That they have to show the lack of prior art.

17 And it's also my understanding that because we're not in the district
18 court we're in PTAB, that there would be a preponderance of the evidence
19 would be the burden.

20 Petitioner did say something along the lines of, as soon as they present
21 some argument, they didn't use burden, but yet they made it seem like it was
22 kind of on us now, the Patent Owner. That's not the way burden of proof
23 works. They have to at least put forward some prima facie evidence that
24 there is no prior art. And because of the procedural end they were required
25 to do that in the petition. Which they undisputably did not. They didn't
26 even rely on any of the slides.

1 So my first, my first jump around is I'm going to start on Slide 10.
2 And address the two arguments that were actually in the petition. And I'm
3 doing this not so much to say, oh, Your Honors, don't pay attention to the
4 new arguments in their reply and in their surreply. You could very well do
5 that because they were supposed to include that in the petition, but they're
6 wrong anyways.

7 That's not the focus of this. The focus of this is, there's been some,
8 I'll call it blame or accusations that we've been trying to hide the ball
9 because we didn't focus enough on the multidimensional aspect of Claim 5
10 and 15 and 25. That it's a multidimensional constellation.

11 And almost indirectly that your institution decision didn't address the
12 multidimensional issue. Well, that's because they're rewriting history.
13 They never brought up one dimensional versus a multidimensional issue in
14 the petition to begin with, which was what everybody was focused on.

15 Multidimensional didn't come up until after the institute, institution
16 decision. After you preliminarily said that for, at least for Claims 5, 15 and
17 25, their arguments don't hold water. If it was just those claims it wouldn't
18 have been instituted. In fact, in another similar patent IPR where it was the
19 same limitations and the same arguments, you denied institution outright.
20 And that's in the slide, I'm not going to go into that.

21 But this notion that we've been trying to hide, or you mistakenly
22 ignored this very important multidimensional issue, it's just rewriting history
23 because they never raised a multidimensional issue. Here's the first,
24 amongst Slide 10.

25 They had two arguments in their petition as to why it wasn't prior art
26 in Barsoum. Barsoum didn't include a written description or Claim 5. And

1 one of their arguments was the one on the left here. On Pages 13, 14 of the
2 petition. And I'm sorry, I (indiscernible.)

3 And they're talking about that there is this requirement of a
4 relationship between two groups of constellations that isn't supported. That
5 there needs to be a first group of constellations and it has to have some
6 relationship to a second group. There's nothing in the claim about groups.
7 That's why this has fallen away. That's why this was rejected.

8 What's in the claim is there needs to be a plurality of different non-
9 uniformed multidimensional symbol constellations. So that is just number
10 one.

11 So all this claim requires is that you have to have one constellation
12 and a second constellation. And one constellation has to have, not the best
13 possible decoding capacity, which is what they're trying to read into the
14 claims. It just needs to have a greater parallel coding capacity, have
15 specifics (indiscernible) than the other constellation plurality.

16 There's no groups of constellations versus other groups of
17 constellations. It's a plurality of constellations. One has to be better at its
18 SNR, have to have greater parallel decoding capacity, then the other.

19 JUDGE RAEVSKY: Counsel, this is Judge Raevsky.

20 MR. WILLIAM: Yes.

21 JUDGE RAEVSKY: So my reading of the Patent Owner response is
22 that you cited some portions of the specification that discussed optimizing
23 for SNR and support for this limitation. So why is it that your position of
24 the claim does not require optimization? Because --

25 MR. WILLIAM: Well, there is two levels to that. One is, there is
26 optimization shown. There is at least two kinds of multidimensional

1 constellations that are described as being optimized or single to noise, at a
2 single to noise ratio for parallel decoding capacity. Is what their
3 orthogonalize optimization.

4 And then there's the second optimization that says the constraints that
5 are usually used orthogonal, where the spacing between the constellations is
6 going to be equal for each of the dimensions for the in phase the quadrature,
7 we're not going to have that constraint. That's the second one that's
8 disclosed at the end of the patent where it says, optimize freely.

9 So our point was, as a result of the discussion of optimization
10 throughout, of constellations throughout the patent, in no specific examples
11 of how to achieve that for multidimensional, if you optimize whether you're
12 using constraints or non-constraints, you're going to get a constellation
13 that's got a greater parallel decoding capacity at the SNR that it was
14 optimized versus the other constellation that was optimized at a different
15 SNR. Whether it's the orthogonal optimization, whether it's the free in
16 every dimension.

17 So our point was that you get through the optimization that's
18 described. But what they're said is, they haven't disputed that if you do
19 what those two examples are, and I don't want to just focus on those two
20 examples because there's more, but if you just focus on those two examples,
21 they don't dispute that you'll get your parallel decoding capacity at the SNR
22 for this optimized constellation versus that one. What they've said is, hold
23 on.

24 But what they've said is, the orthogonal optimization, it might be
25 greater but it's not as good as the other one. It's not as good as if you freely
26 optimize in both dimensions rather than in the orthogonal, one of the

1 constraints of the optimization is you want the spacing to be the same in
2 both dimensions.

3 The second method disclosed, and both of those methods are what's
4 disclosed in Fuentes. And he says they're optimized. Both. One is
5 optimized to a greater capacity, but that's not what optimized means. And
6 that's what they're trying to read in. they're not trying to read in optimized,
7 they're trying to read in a version of optimize that means the best you can
8 possibly get.

9 JUDGE RAEVSKY: Thank you, Counsel. I'll ask a related question
10 that I also asked Petitioner.

11 MR. WILLIAM: I'm sorry, I'm --

12 JUDGE RAEVSKY: No problem.

13 MR. WILLIAM: -- (inaudible.)

14 JUDGE RAEVSKY: Yes. Which is, does the claim require non-
15 uniformity in multiple dimensions or just one dimension?

16 MR. WILLIAM: Does it require non-uniformity in multiple
17 dimensions. I'm going to try to answer that. The bad answer, which I'm
18 going to give you first is, it depends on what you need, Your Honor.

19 But let me try to use the orthogonal one as an example. And I'm not
20 going to skip around, you guys know what the figures look like. So there's
21 the figure that they say, ah-ha, it's a PAM, it's just a PAM that has different
22 constellations. And in each constellation there's a space in there, and it's
23 different from constellation to constellation, depending on what the SNR is,
24 right?

25 And so it has been optimized in that single dimension. In the
26 orthogonal optimized multidimensional there are two dimensions. there's

1 the in-phase dimension and there's the quadrature dimension. And the way
2 the patent describes making that optimized multidimensional constellation,
3 which again, is the same one that's actually discussed in Fuentes, is start
4 with the optimized PAM constellation. Right? Start with that, use that as
5 your in-phase.

6 Copy that so you've got two optimized PAM constellations. You're
7 going to use the second one as your quadrature dimension. And it's just
8 going to be 90 degrees updates. So you've got two that are optimized.

9 Now within those the constellation points are, and do need to be, non-
10 uniformed. So in the first dimension it's, the different constellation points
11 aren't equally spaced with each other.

12 But if you're comparing the spacing in the first dimension to the
13 second dimension they're actually identical. Within them they're non-
14 uniformed. But it doesn't have to be different spacing in the first dimension
15 than there is in the second dimension. Is that, I don't know if I answered
16 your question --

17 JUDGE RAEVSKY: I think I understand. But maybe I can
18 illuminate it in a slightly different way. So Petitioner's Slide 29 reproduces
19 Figure 1.2 from Fuentes. And Petitioner characterizes, I'll give you a
20 moment to get to that figure.

21 MR. WILLIAM: I've got it. I've got it.

22 JUDGE RAEVSKY: Okay. Petitioner appears to characterize the
23 figure to the figure to the right, which includes the circular constellation as
24 mapping to Claim 5. And the figure in the middle as what's in the 777
25 patent. Do you agree with that characterization?

1 MR. WILLIAM: In part I think, Your Honors. Because remember, in
2 addition to the discussion of just, in the 777, in the Barsoum patent, in
3 addition to the entire first session being not limited to one dimensional
4 constellation but constellations in general, and it's actually referenced that
5 the constellations that are being talked about are Patent M points, so how
6 many ever points you want, and N dimensions. However in any dimensions
7 you want.

8 And that whole introduction is not about PAMs. It's not about single
9 dimensions, it's about constellations in general regardless of how many
10 dimensions there are, regardless of how many points. And it teaches, if you
11 optimize those for a certain code rate, for example, you're going to want to
12 do it at different SNRs because you're going to get, because you'll be better
13 if you do one constellation of this SNR versus a different SNR.

14 So that's the giant, that's the message right from the beginning. And
15 then when we get beyond that there are examples here. How can you apply
16 that to a PAM, it's discussed. How can you apply that to a PSK, that's
17 discussed.

18 And then it's given two different multidimensional ways you can do
19 it. The orthogonal optimized PAM version, which was the majority of what
20 they were talking, and then the second one where there is optimization freely
21 in both dimensions rather than both dimensions in (indiscernible.)

22 So what we're looking at in slide page, on Slide 29, from the
23 Petitioner, yes, the middle version is a example of a optimized
24 multidimensional constellation done with the orthogonal constraint. So in
25 other words, the spacing of the in-phase is going to be the same spacing as

1 the quadrature. That's why you get this kind of, Fuentes calls it like a square
2 shape, right?

3 But the one on the right is the second multidimensional optimization
4 method discussed in the patent. And it's the last one that says, and you can
5 also not constrain yourselves by orthogonalizing the PAM. You can
6 optimize in all dimensions. So in other words, the spacing of the in-phase
7 dimension doesn't need to be the same. And that's what's on the far right.
8 So both of these are examples of what's disclosed in the patent.

9 Fuentes discloses both of them as being two-dimensional. In-phase
10 and quadrature. There's two dimensions in each of them. He says that both
11 optimize, it's just that the one on the far right is optimized without the
12 orthogonal constraint. And each --

13 JUDGE RAEVSKY: I'm sorry.

14 MR. WILLIAM: If I could just hit this one --

15 JUDGE RAEVSKY: Yes, go ahead.

16 MR. WILLIAM: -- because I don't know if I'm ever going to get
17 back here. I apologize for this.

18 But Fuentes also says, this is at Page 75 of the Fuentes reference,
19 Exhibit 1030. In describing both of these, at any SNR there's always a
20 particular NUC, so non-uniform constellation. These two constellations he's
21 talking about that maximize the greatest BICM capacity. BICM is a type of
22 parallel decode capacity.

23 So not only is Fuentes saying these are multidimension, not only is he
24 saying that they're optimized, again, these are both versions are in Barsoum,
25 he's concurring, he's agreeing, he's confirming that in each of those cases

1 you are going to get a constellation that has a greater parallel decoding
2 capacity at the SM, at the single (indiscernible) than the other ones.

3 So I'm sorry, Your Honor.

4 JUDGE RAEVSKY: No, thank you for --

5 MR. WILLIAM: -- cardinal number, I broke cardinal rule number
6 one.

7 JUDGE RAEVSKY: I'm okay with that. So one easy question, and
8 then one harder question. The easy one you can feel free to respond quickly
9 to and then I'll jump into the harder one.

10 So my understanding then is, because you believe that Claim 5 covers
11 both the middle diagram and the right diagram of Figure 1.2 of Fuentes, and
12 therefore since Petitioner agrees that the 777 patent supports the middle
13 diagram, then the claim is supported?

14 MR. WILLIAM: Very much.

15 JUDGE RAEVSKY: Okay.

16 MR. WILLIAM: So --

17 JUDGE RAEVSKY: So now, when I first read the reply, at first I
18 thought that Petitioner may have been drawing a false equivalence between
19 Fuentes's description of a 1D constellation, which actually is in two
20 dimensions, and the 1D PAM described in Column 12 of the 700 patent.
21 However, the sur-surreply on Page 3 explains that this is a 1D constellation
22 because it's formed by optimizing a 1D constellation and then
23 orthogonalizing it. So did the sur-surreply fix that potential false
24 equivalence?

25 MR. WILLIAM: I guess it depends what you mean by fix. I think
26 they acknowledge, in my mind, that they were wrong in the reply. That

1 when they were saying that the 1D, mentioned, that's discussed in Fuentes,
2 was not multidimensional. That it is multidimensional. It's got two
3 dimensions. It's got the in-phase and the quadrature.

4 That I think what they've done is now, I'm trying to think of the best,
5 a nice word. They've admitted that when Fuentes is talking about 1D he's
6 not talking about a one-dimensional constellation, what he's talking about is
7 really, what are the constraints? What type of optimization is done on that
8 constellation versus another constellation.

9 So in 1D it's not talking about how many dimensions the constellation
10 is, it's talking about what kind of optimizations. It's talking about
11 (inaudible.)

12 So we've been talking about orthogonalizing the PAM again, right, in
13 the 777 patent from Barsoum. You can just copy that for the second one,
14 that optimized, and they'll both have the same, or with the constraints that
15 they have to have the same spacing you can actually go ahead and waste
16 your time and optimize the second one, you're going to get the same results
17 because they have to have the same spacing between them.

18 So the 1D is not referred to. I think the way I would put it is, they
19 certainly admit now that when Barsoum is talking about 1D he is not talking
20 about one dimensional constellation, what he's talking about is the type of
21 optimization that was used on a multidimensional constellation. And that's
22 what's required here.

23 I don't think there is any dispute now that the orthogonalized
24 multidimensional constellation gets discussed in the patent, and discussed in
25 Fuentes is a multidimensional symbol constellation. It's non-uniformed, it's
26 multidimensional. It's what's being claimed here.

1 And it has a greater parallel decoding capacity at the SNR. It was
2 optimized. Versus the other ones, which would be optimized, at a different
3 SNR.

4 Their argument, as I understand it, is repeatably, and this doesn't even
5 have anything to do with the second method, right? The one where, in the
6 patent and in Fuentes, where you can freely optimize. Right?

7 But their argument about why orthogonal is not good enough, why
8 optimizing, as disclosed is not good enough, is that, well, if you optimize a
9 different way, if you optimize to get that 2D optimization freely, that would
10 actually have different spacing in each dimension and presumably it would
11 be better. It would be greater than the other one. That doesn't matter.

12 JUDGE RAEVSKY: Your point is that the claim doesn't require --

13 MR. WILLIAM: Right. It doesn't require the best. And when they
14 say they're not reading optimized in, they are when they're making the
15 argument that, well, something could be better so it doesn't, so what's not
16 better doesn't meet it.

17 This doesn't need to be better than anything in the world. The
18 claimed multidimensional constellation just needs to be better at its SNR
19 than the other constellation at its SM.

20 And so, when they're arguing, well, the 2D in Fuentes is different,
21 look at the circles versus the squares, it's different. And Fuentes says that
22 can be better, that is beside the point because that's not what the claims
23 require. It's not claiming the best. That's not what optimize means. Even if
24 it was part of the claims, and it's not.

25 Does that --

26 JUDGE RAEVSKY: Yes, the answer.

1 MR. WILLIAM: Thank you. Let's see here. I'm going to regroup.
2 I'm going to figure out where to steer next.

3 Okay. So again, I don't want to spend a lot of time on the previous
4 arguments, by which I mean the petition arguments. But there was a second
5 one. And the second one was essentially pointing to a sentence in the spec
6 that said, this is what I get for jumping around.

7 In Barsoum, Column 6, Line 13 through 15. It said, not all
8 geometrically shaped constellations have greater capacity than that of a
9 constellation maximized (indiscernible.)

10 So the patent says correctly, Barsoum says correctly, you know, it's
11 not always going to work out that a non-uniformed, a geometrically shaped
12 constellation is actually going to get you a better (indiscernible.) It depends
13 on what the signal to (indiscernible) to ratio, it depends on the system you're
14 using.

15 And they pointed to that and said, ah-ha, see, not all of the pluralities
16 are going to be capable of providing greater parallel decoding capacity.
17 Again, that's not what's claimed here. What's claimed is not that you have
18 to, your constant, plurality of constellations has to necessarily always be
19 better than one that's got, that's maximized for (indiscernible,) right?

20 A constellation that has uniformly spaced constellation points isn't
21 part of the claim. That's not the comparison. But that's the comparison they
22 tried to make. And they weren't arguing that there weren't any optimized
23 non-uniform multidimensional symbol constellations disclosed in Barsoum,
24 they were just saying there might be some that aren't better than ones that
25 are uniformed.

1 And again, the point was, that doesn't matter. That's not of the claims
2 here. So that was their second one. that's fallen by the wayside.

3 And so what happened was, in our preliminary response we correctly
4 said, look, what's required is what we've been talking about, greater. And
5 how is greater disclosed, well, it's disclosed because that's the point of the
6 whole patent. And then it gives specific examples.

7 And we went on and said, exactly what I've been talking about with
8 you. We can take the PAM, that there is two methods disclosed for getting
9 the greater. And that's what we disclosed. And that's what our preliminary
10 response was. That's what the Board relied on.

11 That what they were pointing about was not what was actually
12 claimed. They had it shown that it wasn't in Barsoum, and Barsoum
13 actually does show that the great, that you can. And it's described that
14 multidimensional constellations, where one is going to have a greater
15 capacity at it's SNR than the others, all of that was disclosed.

16 It wasn't until after the institution, after our response which basically
17 dropped the other claims to focus on the ones that you had said they're not,
18 you haven't met your burden Petitioner here, and made the same arguments.

19 It wasn't until after that, oh, hold on a second, multidimension is not shown
20 at all.

21 It's not that it's just not that all of the plurality are shown, which is
22 what their petition argument was, now it was, it's not shown at all. And
23 that's when we get into, what does the patent actually talk about, what are
24 the two different methods that are, example methods that are disclosed for
25 creating an optimized multidimensional constellation which is going to

1 result in the greater than limitation here, that's when we get to, and that's
2 what I'd like to address now unless there is something else on the table?

3 (No audible response.)

4 MR. WILLIAM: Okay, thank you. Can we go to 22 please? All
5 right. So I -- we're going a little bit out of order here, but this is just, for
6 whatever reason the parties started calling the (indiscernible) one, the first
7 approach, even though it's mentioned second in the part. And the
8 orthogonalized one the second approach even though it's mentioned first.

9 Before I get into that though I think it's important to know the context
10 here. Because, frankly Petitioner had argued, at least several times today,
11 that we're trying to read things into the patent. And by the patent I mean
12 Barsoum. The prior art.

13 The opposite is true. Petitioner is putting on blinders and saying, ah-
14 ha, this one sentence here doesn't mention signal to noise ratio therefore this
15 optimization isn't about some of the noise ratio. Even though the entire
16 patent before was talking about, it's a good idea to optimize at a specific
17 SNR.

18 So it's not that we're reading in, it's that in my mind Petitioner are
19 ignoring the teachings of Barsoum and trying to shine a flashlight into a dark
20 cave and ignoring what's not shown. They're only paying attention to what
21 they're shining the flashlight on ignoring what else is in the cavern.

22 So I want to talk a little bit about what's in the cavern. So Barsoum,
23 Exhibit 1015. Here's a detailed description of the invention. And again, I
24 apologize because I'm skipping around so I'm not on the slides right now.

25 But in Barsoum, which they argue is all about PAMs, that's what we
26 said to them, it's just about PAM. That's what the patent is about.

1 Starting at Column 4, Line 47 or so, there is a, there's start of the
2 detailed description of the invention. And I'm not going to go through all of
3 these, but it makes it perfectly clear, and it had already, that these
4 embodiments of the inventions are about unequally spaced IE geometrically
5 shaped points. The invention is about unequally spaced constellations.

6 Later on, when they're trying to address the freely optimized example
7 of a fully multidimensional they make a point, well it doesn't say unequally
8 spaced in this sentence, how would someone know that it's unequally
9 spaced? Because the whole patent has been telling you that the whole point
10 of the invention is to optimize to have unequally spaced. And that that
11 description of optimizing is talking about the dimensions of space.

12 There is no way a POSITA, whether he's got a PhD, a masters or is a
13 grad, whatever, is going to read this whole patent and not know that when
14 this patent is talking about optimization and the result in constellations it's
15 talking about unequally spaced constellations. That's an example of, shine
16 the flashlight on one sentence ignoring the rest of the cavern. Ignoring the
17 rest of the (indiscernible) of Barsoum.

18 Under that, column 4. And again, this is just talking about
19 constellations, it's not talking about PAMs. It's not talking about single
20 dimensional constellations. It's talking in general that when you optimized,
21 this is starting at lines 64 of Column 4.

22 Constellation points. If you optimize the constellation using a
23 capacity approaching channel code, such as what's claimed, right, that that
24 can yield different constellations depending on the SNR for which they're
25 optimized. Again, not talking about PAMs, not talking about single, it's the
26 whole point of this, right up front is, when you optimize these constellations,

1 when you optimize constellations period and use the non-uniform spacing
2 that nobody thought you should use, you're going to get better results with
3 one constellation out of SNR that it's optimized for than you'll get for
4 another.

5 This alone put the why to, nobody would know what these
6 disclosures, later disclosures are, nobody would know what they mean. And
7 that it's all about PAM. PAM hasn't been mentioned at all yet. And in fact,
8 when they introduce about what kind of constellations are we talking about
9 in this intro section, Column 6 of the Barsoum reference. Exhibit 1015.

10 You know, I mentioned this earlier, Line 23 or so. It's talking about
11 the constellations we're talking about can have a total number of
12 constellation points M . So in other words, wherever you want. I mean,
13 mathematically it won't be wherever you want but it's not limited to a
14 certain number of constellation points.

15 And a number of real dimensions and them. They're not talking about
16 just single dimensions in this whole intro they're talking about constellations
17 in general. They're talking about optimizing constellations in general so
18 they won't have uniform spacing between the points, they'll have non-
19 uniform spacing.

20 And when you do that you want to have different optimized
21 constellations at different SNR because you're going to get better results.
22 That's what claimed. Before we even get to the examples that's what's
23 claimed here.

24 And then we got different examples of, we just talked about
25 optimizing constellations, now we'll give you an example in Barsoum of
26 PAM. One dimensionals. Then we'll give you another example of a one

1 dimensional, and then we're going to give you examples of
2 multidimensionals that fall within exactly what we talked. And here is
3 different ways to optimize, multidimensional, non-uniformed constellations
4 that are going to have a greater capacity at their optimized SNR than a
5 different constellation optimized for a different SNR.

6 The first one that's talked about, the first example, specific example,
7 is the orthogonal version that we talked about already. The second is this
8 one. Which says, that optimization stuff we've been talking about, you can
9 go ahead and do that in all of the degrees of the dimensions.

10 Such constructions constitute embodiments of the invention.
11 Everything we've just been talking about, this is what it is. Optimize, take
12 direct advantage in the optimization (indiscernible.) Instead of
13 orthogonalizing where everything is going to be equal in the space and such
14 everything, where the spacing is going to be equal in one dimension versus
15 the other, you don't have to do that. You can have degrees, additional
16 degree of freedom by the extra spatial dimension. In other words, optimized
17 in each dimension however you see fit.

18 Remove that optimization constraint from the orthogonal version, and
19 what are you going to get? You're going to get exactly what they've been
20 talking about. You're going to get a non-uniform multidimensional
21 constellation, however many dimensions you want, two, three, it doesn't
22 matter, you pick, but just optimize each. You can optimize each of those
23 dimensions and you're going to get what we were just talking about.
24 Throughout this whole patent.

1 And it goes on to say they made a big deal about the complexity here.
2 The complexity of the organization step, I'm reading from the
3 nonhighlighted part because I guess that's what you're doing today.

4 The complexity of the optimization step flows exponentially in the
5 number of dimensions. As does the complexity resulting (indiscernible.)
6 That's a big topic in Fuentes which they rely on. And they make a big deal
7 about, oh, it's going to take a long time to explain.

8 That doesn't mean somebody doesn't know how to do it, all it's
9 basically saying is, last sentence, such construction constitute embodiments
10 of the invention and simply require more one time to produce. So if you're
11 going to optimize in one dimension and copy it, orthogonalize it's easier to
12 do that. It doesn't take as much time to do that. If you're going to
13 separately optimize in each individual dimension it's going to take longer.
14 It's going to take more one time to produce. That doesn't mean this isn't a
15 description of what's being claimed.

16 And even if this wasn't sufficient to show somebody who to do this,
17 that's an enablement issue. That's not a written description issue that's an
18 enablement issue.

19 And I don't want to spend too much time on this because I don't think
20 it's really relevant, but they bring up a lot of testimony from Dr. Caire. I
21 know I don't have to say this, but I, just on the record, I encourage you to
22 look at what Dr. Caire actually said and what its relevance is here.

23 For example, they make a big deal about Dr. Caire saying, if you want
24 me to explain that to me it's going to take a while. Now does that mean it
25 wasn't known at the time, no, it doesn't. And even if it wasn't known that's
26 an enablement issue.

1 And by the way, what Dr. Caire was asked was not how to optimize a
2 constellation in all these degrees, what, the complexity of that, it was the
3 demapper that the receiver was going to have to use to demap that type of
4 freely optimized. That is highly complex.

5 And that's the subject of Fuentes. Again, Fuentes says the middle, the
6 middle one has advantages, the one to the right has advantages. The
7 orthogonal is easy to do. It might not be as great from an optimization
8 standpoint as the one on the right because it's easy to do and you can have a
9 simple demapper to use.

10 The tradeoff of using optimization in all levels, excuse me, not in all
11 levels, that didn't make sense. In all dimensions, you might get a higher
12 capacity for that particular type of optimization, but it's going to take a lot
13 more work. And you're going to have to have a very complicated demapper.
14 Fuentes says that. The patent says that. It's going to take more time and
15 you're going to have a more complex demapper.

16 It doesn't matter what's disclosed here is optimizing in all dimensions.
17 And the result is a multidimension constellation. Non-uniformly spaced.
18 It's going to be exactly what the patent has been talking about all along.

19 You're going to have one SNR and you're going to get a constellation
20 that's going to be better at that one. If you optimize at a different SNR, that
21 constellation is probably going to be better at that SNR.

22 Are there any questions about details that were supposedly missing
23 from this because I do want to say, they lose, they should lose on this alone.
24 This alone is a written description of what's planned. They can complain
25 about the orthogonal not being as good as this one, which doesn't matter.

1 They can complain about, they can try to read in, and no, it's a certain
2 kind of opt, it's a certain kind of capacity that's being claimed here even
3 though it doesn't say that. It just says priority code, capacity. But let's just
4 put aside the orthogonal.

5 They admit this is multidimensional. They admit it's being optimized.
6 And according to them Fuentes says this is the best you're going to do. So
7 how is this not a written description of what's being claimed here. I don't
8 know.

9 On that note I guess I'll save, unless there is other questions I'll save
10 the rest for rebuttal please.

11 JUDGE RAEVSKY: Thank you.

12 MR. WILLIAM: Thank you, Your Honors.

13 (Long pause.)

14 JUDGE DOUGAL: Petitioner, whenever you're ready.

15 (Long pause.)

16 DR. USMAN: Thank you, Your Honors. Based on Patent Owner's
17 comments I think it might be helpful to revisit what exactly it means. That
18 is, what exactly is the parallel decoding capacity?

19 Let's turn to the patent. This is from, I believe, Column 6 of the 777
20 patent. You see here, let's look at Lines 45 to 51. Expressed another way,
21 the parallel decoding --

22 JUDGE RAEVSKY: Counsel, which slide are we on?

23 DR. USMAN: I'm sorry, Your Honors, this isn't one of the slides.
24 This is the 777 patent --

25 JUDGE RAEVSKY: Okay.

1 DR. USMAN: -- Column 6, Lines 45. That is Exhibit 1015.
2 LGE1015.

3 JUDGE RAEVSKY: Thank you.

4 DR. USMAN: Okay.

5 JUDGE RAEVSKY: I got it. I'm sorry.

6 DR. USMAN: Thank you. So this particular section says, expressed
7 another way, the parallel decoding capacity of a channel can be viewed in
8 terms of mutual information between the output bits of a decoder, at the
9 transmitter the likelihood's computer by the demapper at the receiver. Use
10 key. The parallel decoding capacity is influenced by both the placement of
11 points within the constellation and by the labeling assignments.

12 The placement of points within the constellation and the labeling
13 assignments. This is different. The labeling and the spacing of points is
14 different in multidimensional constellations and in one dimensional
15 constellations. We'll see this --

16 (Long pause.)

17 DR. USMAN: Let's turn to Slide 27, Your Honor. Slide 27 says,
18 when you increase the dimensionality of a constellation it allows for a larger
19 minimum distance for constant constellation of energy per dimension.
20 Right?

21 It's telling you the spacing is going to be different. The 777 patent
22 tells you that the parallel decoding capacity is dependent upon the spacing
23 and labeling of points. Now all of a sudden we're turning to 1D dimensions,
24 optimizing them, orthogonalizing them and saying, yes, that's the same
25 thing. No.

1 What the claim requires, parallel decoding capacity is a characteristic
2 of the channel. To see how the claim is satisfied you have to consider the
3 constellation as a whole. And see whether or not that constellation, as a
4 whole, would have the kind of parallel decoding capacity in the channel
5 that's being used in the communication system.

6 We cannot isolate one dimension, have a constellation, and then use
7 that to determine the parallel decoding capacity. That's not what the claim
8 says. Patent Owner's remarks seem to fundamentally misconstrue that.
9 They're not taking account, what does it mean to parallel decoding capacity?

10 Let's move on to the other section they point to. Patent Owner just
11 spend a lot of time focusing on this particular disclosure. This is from their
12 own deck, 777 patent.

13 I want to ask Your Honors, see nowhere, nowhere in this disclosure is
14 there even a mention of SNR. There's no mention of parallel decoding
15 capacity. Zero. What it tells you is optimization.

16 JUDGE DOUGAL: Just for the record I want to say we're on Patent
17 Owner's demonstrative Slide 23.

18 DR. USMAN: Thank you, Your Honor. What this tells you is, yes,
19 you can optimize. And we keep saying, well look, this doesn't satisfy the
20 claim. Why? Do we see SNR here? Do we see parallel decoding capacity
21 here? No.

22 It just tells you there is some type of optimization that you can do.
23 You can do some authorization. Sure, we can. That's not what the claim
24 requires. That's not what the claim says. They point to this, it's explicitly
25 clear. It's not clear. What this requires you to do is to go fishing, right?

26 Let's go to what the requirements are for written description support.

1 (Long pause.)

2 DR. USMAN: Slide 6, Petitioner's demonstratives. This is the
3 Lockwood case. It says, while the meaning of terms and phrases of
4 diagrams in the disclosure is to be explained or interpreted from the
5 advantage point of one skilled in the art, all the limitations must appear in
6 the specification. So all the limitations was SNR, PDC in that description,
7 no.

8 The question is not whether this would be obvious to a person of
9 ordinary skill in the art is that the application must describe the invention,
10 and to do so in sufficient detail. There is just none of that.

11 As I mentioned earlier, is there any description of a QAM being
12 compared to another QAM, seeing what the effects of that are under the
13 parallel decoding capacity in the channel. No, just none of that.

14 Related, in the Lockwood case, right, here again there's a focus that
15 the specification must contain an equivalent description of the claim subject
16 matter of a description of which renders obvious the claim is just not
17 sufficient. But saying maybe it's not obviousness. We can't be left in the
18 dark. The specification has to shine light. It has to show that you have
19 possession of the invention. They just don't have that.

20 The disclosure they rely upon is a per dimension basis. On a per
21 dimension basis orthogonalizing. None of this stuff is relevant to the claim
22 features.

23 They mention that the petition doesn't even mention the word
24 multidimension. Let's go back to the petition.

25 JUDGE CYGAN: Counsel, before we leave this point I want to make
26 sure I understand your point here.

1 DR. USMAN: Yes, Your Honor.

2 JUDGE CYGAN: So the point that you're making is, to the extent
3 that the capacity characteristics of the QAM-64 are identical to those in a per
4 dimension basis, that doesn't tell you anything about the capacity
5 characteristics of the multidimensional constellation itself?

6 DR. USMAN: You're absolutely right. That's right.

7 JUDGE CYGAN: So that even if on a per dimension basis they're
8 identical, you're still not going to get to the language of Claim 5 because it's
9 not telling you, in the aggregate, how it compares to other civil
10 constellations?

11 DR. USMAN: You're absolutely right.

12 JUDGE CYGAN: If I can ask you about something your counterpart
13 mentioned about claim, about Column 6 of Barsoum. Your counterpart read
14 to you around Line 15 of Column 6. If I understand correctly, was
15 discussing this approach as sort of a direct optimization of a
16 multidimensional symbol constellation. And I believe was relying on that to
17 get directly to Claim 5 limitations.

18 What's your, what is your characterization of this portion of Barsoum?

19 DR. USMAN: So I can give you a high-level --

20 JUDGE CYGAN: Okay.

21 DR. USMAN: But I want to know specifically which point in this?
22 Which --

23 JUDGE CYGAN: Yes, I believe it was the part that starts with, one
24 approach.

25 DR. USMAN: Yes.

1 JUDGE CYGAN: Optimize the shape with respect to a given SNR.
2 And I believe that was discussing it in the context of a multidimensional
3 constellation.

4 DR. USMAN: Yes. Thank you, Your Honor. And actually I'll take
5 the opportunity to point out the sentence right before that sentence. And this
6 is highlighted in the petition too. That sentence right before that sentence
7 says, not all geometrically shaped constellations have greater capacity than
8 that of a constellation maximized (indiscernible) not all. Right? It's saying
9 that, look, not all these constellations have that greater capacity.

10 And I'm going to just say, yes, one approach to selecting a
11 geometrically shaped constellation having greater capacity is that of a
12 constellation maximized (indiscernible) and to optimize a shape with respect
13 to measure the capacity of a constellation for a given SNR. Right?

14 And then that approach of optimizing, right, it's, again, there is no
15 mention of parallel decoding capacity here. Right? And also, the other
16 thing is, you can select a geometrically shaped constellation that has a
17 constellation maximized (indiscernible.) Right? That constellation that's
18 maximized for (indiscernible) is not necessarily non-uniformed
19 constellation. Right? You mentioned here there is not a mention of non-
20 uniformed constellations. Right?

21 So again, what we find is key words. Key words in the claim, non-
22 uniform, multidimension, parallel decoding capacity, SNR. In the various
23 disclosures that they point to these terms are missing. Here you see the non-
24 uniform part is missing. The sentence before that tells you that not all the
25 constellations have greater capacity.

1 We can turn to other evidence too, but I'm over my time. I want to be
2 mindful of that. If you have any other questions I'm happy to answer.
3 Thank you.

4 JUDGE DOUGAL: Okay, thank you.

5 MR. WILLIAM: So, Your Honors, thank you for the chance to rebut
6 that. And I'm going to be, hopefully, very brief. I'm going to go in reverse
7 order what I heard.

8 Try to take us to task that the petition for the petition actually did
9 mention multidimension. That wasn't our point, that's not what I said. The
10 point was the petition didn't argue that the reason 5, 15 and 25, those claims
11 lack priority in Barsoum. They didn't argue that it was because there is no
12 disclosure in Barsoum of the multidimension constellations that are being
13 claimed in Claim 5. Multidimensional did not fall within their arguments at
14 all, it was the few arguments that I mentioned earlier, which they
15 complained about at the end.

16 And I do want to go back to, Your Honor mentioned their petition
17 expert, excuse me, their expert's declarations for the petition, Paragraph 135.
18 It says what you said, Your Honor, it doesn't say what Counsel said. It
19 says, nonetheless, the constellations of Figure 11B, 13B, 15B, 17B are one
20 dimensional PAM constellations.

21 Now I think that I'm going to step back. It's important to remember,
22 this is in his invalidity analysis where he's saying, here's why what's
23 claimed is actually shown by Barsoum, et cetera, right? He's not arguing
24 that there is no priority here, this is where he has to pivot and say what's
25 being claimed is actually shown. So he's saying yes, those are one
26 dimensional, however, the 777 patent, Barsoum, explains that one

1 dimensional geometric PAM constellations can be optimized into
2 multidimensional QAM constellations.

3 The optimization is for the QAM. It's for the multidimensional. It's
4 not just that the PAM is optimized and who knows what's going to happen
5 after that. So yes, I don't doubt that the words, or the phrase,
6 multidimensional showed up many times in the petition since it's in the
7 claims.

8 The point is, they never argued what they're arguing now in the
9 petition. And what they're arguing now is wrong, so I'll go, again, in
10 reverse. They talked about the freely optimizing each dimension. It's
11 disclosed in the patent, it's discussed in Fuentes. I mean, I couldn't have
12 come up with a better example of what I meant by shining a flashlight into
13 the cave and ignoring everything around it.

14 They point to the part, it's still up here. All that stuff we were talking
15 about optimizing before, here's a way to do, here's another way to do that
16 for multidimensional. And do the words SNR show up there, no, they don't.
17 Because the whole six columns before that said, it's a really good idea that
18 when you optimize, optimize for a specific SNR. And this is telling you
19 what to do.

20 Your Honor, you just pointed that out and it was like, oh, that doesn't
21 matter. That doesn't matter. It does matter. The context matters. This is in
22 the context of the rest of Barsoum. And Barsoum is saying, for
23 constellations in general it's a good idea to optimize to get non-uniform
24 constellations, multidimensional or not at specific SNRs. You need to read
25 this in light of that.

1 They refuse to do that because that's the only argument they have.
2 Because if they lose on this they lose altogether. And I'll put it to Your
3 Honors, they should lose this.

4 And then the final one, talking about the orthogonal based optimized
5 multidimensional constellation non-uniform. There was a lot of talk about
6 different. That there might be different capacities somehow. I don't know
7 what that has to do with any because the issue is whether, when you do
8 what's there, is it describing something that's going to get you a greater
9 capacity at the optimized SNR for the ortho.

10 Whether it's different or not, and different from what I'm not even
11 sure what the point was, but the issue was not whether it's different or the
12 same it's, are you going to get that greater? The patent says you're going to
13 get it, Dr. Caire said you're going to get it, and the Fuentes article, the
14 Fuentes paper. I read it to you already, I won't read it again, said that if you
15 do this you're going to get constellations that are better at one SNR than the
16 rest of them are. At what? At a parallel decoding capacity. The parallel
17 decoding capacity invited by Dr. Caire as a matter of fact.

18 I don't have anything else to add unless Your Honors have further
19 questions.

20 JUDGE DOUGAL: All right, thank you.

21 MR. WILLIAM: Thank you very much, Your Honor. I'm going to
22 mark the time because I've never left that much --

23 (Laughter.)

24 MR. WILLIAM: -- on the clock. Thank you.

25 JUDGE DOUGAL: All right, thank you. That concludes our hearing.
26 We really appreciate all the work that you've all done in this case and the

1 presentations that you've given us. They've been helpful in helping us
2 ultimately to decide this decision.

3 So this hearing is now adjourned. Hearing requests --

4 DR. USMAN: Your Honor? Sorry, may I --

5 JUDGE DOUGAL: What's that?

6 DR. USMAN: May I comment before we adjourned?

7 JUDGE DOUGAL: Sure.

8 DR. USMAN: Sorry. Thank you. Your Honors, if you have any
9 other questions on our briefing on the issues of burden or anything else,
10 we're happy to, with your permission, offer some briefing on that point if
11 you think it will be helpful.

12 JUDGE DOUGAL: Okay.

13 MR. WILLIAM: Your Honors, I think you know what the burden is,
14 anything (inaudible.) If you want us to do, we'll be happy.

15 JUDGE DOUGAL: Okay, thank you. Appreciate that. So now the
16 hearing is adjourned.

17 (Whereupon, the above-entitled matter went off the record at 11:02
18 a.m.)

IPR2023-00319
Patent 10,693,700

PETITIONER:

W. Karl Renner
Jeremy Monaldo
Usman Khan
Patrick Darno
FISH & RICHARDSON P.C.
axf-ptab@fr.com
jjm@fr.com
khan@fr.com
darno@fr.com

PATENT OWNER:

William Meunier
Michael Renaud
Kevin Amendt
MINTZ, LEVIN, COHN, FERRIS,
GLOVSKY AND POPEO, P.C.
wameunier@mintz.com
mtrenaud@mintz.com
kcamendt@mintz.com