

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DIGITAL GLOBAL SYSTEMS, INC.,
Petitioner,

v.

DEEPSIG, INC.,
Patent Owner.

IPR2024-01358
Patent 11,018,704 B1

Record of Oral Hearing
Held: December 16, 2025

Before: WILLIAM V. SAINDON, DANIEL J. GALLIGAN, and
ANDREW L. NALVEN, *Administrative Patent Judges*.

APPEARANCES:

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P R O C E E D I N G S

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JUDGE SAINDON: We're here for an oral hearing for Petitioner Digital Global Systems, with Patent Owner DeepSig. Let's see. Well, before we get to that point, we have IPR2024-01358 and Patent 11,018,704. I'm Judge Saindon. With me here are Judges Nalven. And joining us remotely is Judge Galligan.

We have 30 minutes per side. Petitioner, you'll go first. If you'd like to reserve some time for rebuttal, just let us know, and we'll run the clock accordingly. Let's see. So let's do our introductions from the counsels. We'll start with Patent Owner so that we can go back to Petitioner and they don't have to get up twice. So Patent Owner, who do you have here today?

MR. HELGE: Good afternoon, Your Honor. Wayne Helge, for Patent Owner DeepSig, Inc. I also have first backup counsel, James Wilson, from Bunsow De Mory firm. Also, an additional backup counsel with me, Amit Singhal is here from the Rossi law firm and some other business (INDISCERNIBLE).

JUDGE SAINDON: All right. Welcome. And Petitioner, introduce your team.

MR. ROEHRICK: John Roehrick, for Petitioner Digital Global Systems. With me is my colleague, Andrew Cochran and -- from Cahill.

JUDGE SAINDON: You may take the podium. When referring to your slides, please refer to the slide number so that we can coordinate.

MR. ROEHRICK: Not a problem. Good afternoon, Your Honors.

1 My name is John Roehrick, attorney for Petitioner Digital Global Systems.
2 Moving to Slide 2, US Patent 11,018,704, the '704 Patent has an earliest
3 priority date claim of April 17th, 2017. It focuses on mitigating signal
4 distortion using neural networks with predistortion. None of this was new.

5 Predistortion or, literally, adding distortion to a signal to counter
6 the effects of other unwanted distortion to such signal has been known in the
7 fields of electronics and telecommunications for decades. Neural networks
8 have also been known since the 1950s. Other limitations of the '704 Patents,
9 such as the nonlinear predistortion machine learning model or NPDMLM
10 being associated with deployment scenarios, which Petitioner has shown are
11 various hardware scenarios, were not new either.

12 Slide 3, Petitioner has presented three grounds for the Board to
13 find the '704 Patent rendered obvious. First, Petitioner showed under
14 Ground 1, that European patent application Jüschke, in combination with the
15 knowledge of a skilled artisan, rendered independent Claim 1 and dependent
16 Claims 2 through 3 and 7 through 8, as well as similar Claims 9 through 11,
17 15 through 19, and 23 through 24 obvious.

18 Second, Petitioner showed under Ground 2 that US Patent Holt,
19 combined with the teachings of Jüschke rendered all Claims 1 through 24
20 obvious. And third, Petitioner showed under Ground 3 that US Patent
21 Dzierwa, combined with the teachings of Jüschke and Holt, also rendered
22 obvious dependent Claims 2 through 6, 10 through 14, and 18 through 22.

23 JUDGE SAINDON: Counsel, before you move on, just to clarify
24 for Ground 3, Claim 4 is shown in your table here on Slide 3, but Holt and
25 -- you called it Jüschke?

1 MR. ROEHRICK: Correct. Holt and Jüschke for Ground 2.

2 JUDGE SAINDON: So Dzierwa is not involved in Claim 4 for
3 Ground 3?

4 MR. ROEHRICK: Individually, no. Ground 3 would include
5 Ground 2 plus Dzierwa. But correct, Ground 4 is analyzed using Jüschke
6 and Holt. That's correct, Your Honor.

7 JUDGE SAINDON: Okay. Thank you.

8 MR. ROEHRICK: Patent Owner, in response, has chosen to limit
9 arguments to Limitations 1B.1 and 1B.2 and Claim 4; and of course, the
10 similar limitations and claims. All of Grounds 1 to 3 are supported by the
11 testimony of Dr. Zhi Ding, distinguished professor of electrical and
12 computer engineering at UC Davis. Patent Owner has proffered no
13 testimony evidence in support of its positions, nor did Patent Owner opt to
14 depose Dr. Ding. Instead, Patent Owner's positions are limited to attorney
15 argument and the evidence of record presented by Petitioner.

16 Slide 4 here shows Figure 1 of Jüschke, which is a block diagram
17 of an embodiment of its flexible transmitter for mitigating impairment and
18 signal transmission. As you can see, the various parts and signals broken
19 down are directly lined up with the limitations of Claim 1, which is broken
20 down into limitations from the preamble 1P to 1E.

21 For example, we can see how input signal 12 corresponds to and
22 renders obvious the transmit radio signal of 1A. Predistortion neural
23 network 13 corresponds to and renders obvious the nonlinear predistortion
24 machine learning model or NPDMLM of the 1B limitations. Pre-distorted
25 base band signal 16 corresponds to and renders obvious the pre-distorted

1 radio signal of Limitation 1C; and the analog transmitter device, 14, for
2 transmitting radio signals, renders obvious the transmit output radio signal of
3 Limitations 1D and 1E.

4 Slide 5, getting a bit more granular, we turn now to Limitation
5 1B.1, which reads "accessing a nonlinear predistortion machine learning
6 model associated with the base station." And from paragraph 6, Jüschke
7 specifically teaches that it is "desirable to have a more flexible radio
8 transmitter that can support as many standards and signals as possible," and
9 that, "This is not only true for macro-cell base stations but also for small-cell
10 base stations."

11 Here, we see that Figure 1 of Jüschke which illustrates an
12 embodiment of Jüschke's flexible transmitter for mitigating impairments in
13 transmitting signals with neural network 13. Moreover, as paragraph 6, we
14 read, shows Jüschke's flexible transmitter specifically contemplates use with
15 base stations in this example, both macro and small-cell base stations.

16 Slide 6, the crux of Patent Owner's arguments for Limitation 1B is
17 not technical terms such as nonlinear predistortion machine learning model
18 or base station, but rather the phrase associated with. And Patent Owner has
19 taken a position that even though Figure 1 of Jüschke illustrates an
20 embodiment of Jüschke's flexible transmitter with neural network 13,
21 illustrated clearly in the middle, and that same flexible transmitter is
22 specifically taught to be used in macro and small-cell base stations, that
23 Petitioner has not shown that Jüschke renders obvious the nonlinear
24 predistortion machine learning model being associated with a base station.
25 Because Petitioner has, to Patent Owner's estimation, only shown that

1 Jüschke's neural network 13 is merely taught to be implemented within or
2 used in a base station.

3 Slide 7, Petitioner disagrees. Patent Owner provides no evidence
4 in support of its position that a neural network being taught by Jüschke as
5 being implemented or used within a base station does not also teach that
6 same neural network being associated with a base station. Patent Owner
7 provides no claim construction, nor evidence from the intrinsic record to
8 support this reading; nor does Patent Owner provide extrinsic evidence: not
9 testimony, not a technical paper, not a dictionary, and not case law that
10 somehow would establish a meaningful delta between a neural network
11 being associated with a base station and a neural network being implemented
12 within or used in practice with the base station.

13 And this is exactly how the Board previously found for Petitioner
14 on this issue. As the Board previously found, without a proper claim
15 construction, it fails to see how Patent Owner can construe a model being
16 implemented within a base station is not also associated with the base
17 station. Petitioner has at no stage in the record raised or suggested a claim
18 construction that specifically supports excluding a model being implemented
19 with or used in a base station from also being associated with a base station.
20 The Board's previous finding in the institution decision should remain here
21 as well, finding that Jüschke and its flexible transmitter with a neural
22 network being implemented or used within a base station renders obvious a
23 neural network being associated with a base station.

24 Slide 8, we now turn to Limitation 1B.2, which introduces the
25 deployment scenarios limitation.

1 JUDGE SAINDON: Counsel, before we move, I just have a quick
2 question on 1B.1. So on your understanding, Patent Owner's argument
3 hasn't changed at all from the pre-institution stage?

4 MR. ROEHRICK: That is correct, Your Honor

5 JUDGE SAINDON: Okay. Thank you.

6 MR. ROEHRICK: Going back to Limitation 1B.2, this is going to
7 be focusing on the deployment scenarios limitation. And to get some helpful
8 context, here, these deployment scenarios of the '704 Patent are hardware
9 configurations with respect to the claimed neural network's physical
10 location. And this is, again, exactly as the Board previously found in its
11 institution decision. These deployment scenarios, which are exemplified in
12 column 2 of the patent, as well as dependent Claim 3, include, for example,
13 the nonlinear predistortion machine learning model being inside a tower
14 mounted amplifier or being inside a remote radio unit and being in an in-line
15 mode or a fault-tolerant mode.

16 Slide 9. As taught by Jüschke and within the knowledge of a
17 skilled artisan, neural networks, like predistortion neural network 13, include
18 weights and biases that the model use as their learning parameters to learn
19 from training data and further determine how to map inputs to outputs and
20 make predictions. This is essentially what we use machine learning models
21 for. These internal weight and bias parameters make up the corresponding
22 layers of the neural network and shape how it performs and functions.

23 And as shown here in Slide 9, Jüschke, Figure 1, illustrates its
24 flexible transmitter embodiment with predistortion neural network 13 in the
25 middle, inline between input transmit signal 12 on the left and transmitter

1 device with an amplifier on the right. And an exact match to the tower-
2 mounted inline configuration depicted in Figure 6A of the '704 Patent,
3 shown in the top right, nonlinear predistortion system 103, which includes
4 the nonlinear predistortion machine learning model, is in the middle, inline
5 between input 601, again on the left, and amplifier 603 on the right.

6 And on the bottom right is Figure 7A of the '704 Patent, which
7 depicts the remote radio unit in light configuration with the nonlinear
8 predistortion system 103, yet again shown with input 701 on the left and
9 amplifier 703 on the right. And for all three of these, you can see the green
10 line added illustrating the in-line structure of these components in tandem.
11 And furthermore, as shown in Claim 3, the petition demonstrates how
12 Jüschke teaches these deployment scenarios for tower-mounted amplifiers
13 and remote radio units.

14 As petition and Dr. Ding demonstrated, a skilled artisan would
15 have understood that the macro-cell base station discussed in Jüschke is a
16 cellular base station that sends and receives radio signals over a large
17 physical area and includes equipment such as tower mounted amplifiers.
18 Further, a skilled artisan would have understood that macro-cell base
19 stations commonly consist of remote radio units or remote radio heads, a
20 transceiver component that directly connects to and works together with a
21 baseband unit or radio control panel, and processing unit for service to
22 wireless devices.

23 Slide 10. And again, the Board previously found for Petitioner
24 here as well, calling the resemblance between Jüschke Figure 1, the flexible
25 transmitter, as a striking resemblance to the tower-mounted amplifier in-line

1 configuration of Figure 6A of the '704 Patent. As the Board correctly found,
2 deployment scenarios include configurations of the claim model relative to
3 the inputs and outputs, such as the in-line configuration scenarios in which
4 the input to model to amplifier is linearly in tandem.

5 Slide 11. Patent Owners arguments, again, Jüschke rendering
6 Limitation 1 be too obvious are unavailing. First, as one of three arguments,
7 Patent Owner argues that there is a use dependent requirement in the claim
8 language. And looking at the claim language of 1B.2 wherein the nonlinear
9 predistortion machine learning model includes model parameters associated
10 with values corresponding to one or more deployment scenarios in the
11 cellular communication system, there is no use dependent requirement for
12 the limitation or deployment scenarios.

13 Turning to the next slide, Slide 12, the Board specifically rejected
14 this reading in of a use dependent requirement into the claim language,
15 where we see that Patent Owner argues that the weight and bias parameters
16 being used to approximate a transmitter device's transfer function or inverse
17 transfer function, means that it cannot correspond to a deployment scenario,
18 even if such a machine learning model stands to reason that the parameters
19 and values that make that model and its layers would correspond to the very
20 same scenario that the model is in. Patent Owner has not provided any
21 further persuasive arguments that cause the Board to change from this line of
22 reasoning.

23 Now, looking at Slide 13, we see Patent Owner's two other
24 arguments against Jüschke rendering Limitation 1B.2 obvious, which the
25 Board previously again found unpersuasive. The second of these is that

1 Patent Owner reads in an extra selection step into the claim language. And
2 looking at the claim language again, wherein the nonlinear predistortion
3 machine learning model includes model parameters associated with values
4 corresponding to one or more deployment scenarios, there is no such
5 requirement that the model parameters be chosen from what Patent Owner
6 envisions as a selection of at least two or more sets of parameters
7 corresponding to different and unique deployment scenarios. And relatedly,
8 Patent Owner also reads a requirement that one or more means more than
9 one.

10 Next slide, Slide 14. Both of those previous arguments were
11 explicitly rejected by the board. As to Patent Owner's second argument
12 regarding the selection step of multiple models, the Board stated that the
13 claims are not so limited. And as to the one or more language, the Board
14 also made clear that plain meaning of one or more includes only one or one
15 or no more. And like all Patent Owner's arguments, there is no rebuttal
16 expert testimony or other extrinsic evidence proffered.

17 And on top of all of this, dependent Claim 3 of the '704 Patent
18 which claims, "The particular deployment scenario comprises one of,"
19 reinforces this point, the claims only require one deployment scenario and
20 not as Patent Owner argues a selection step from a group of multiple
21 deployment scenarios. So as shown, Jüschke under Ground 1 renders
22 independent Claim 1, as well as similar Claims 9 and 17 obvious for the
23 reasons stated. Patent Owner has not been shown this rendering for the 1B
24 limitations discussed or any of the other limitations in Claim 1. Further,
25 Patent Owner does not address dependent Claims 2 to 3 and 7 through 8 and

1 similar Claims 10 through 11, 15 through 16, 18 through 19, and 23 through
2 24.

3 Slide 15. We now shift to dependent Claim 4. Below, we see
4 Claim 4 broken up into limitations 4A, 4B, and 4C. And beginning with 4A,
5 I want to focus on the language obtaining a received radio signal that
6 corresponds to a representation of the transmit output radio signal received
7 at one or more radio receivers. The operative language here is that a
8 received radio signal only needs to correspond to a representation of the
9 transmit output radio signal received at a radio receiver. And based off this,
10 correspond to a representation claim language and is supported by the
11 specification. The received signal here reads as a modeled signal.

12 JUDGE SAINDON: Counsel, I have a couple of questions on this
13 limitation. So from Claim 1, we have a method, and the claim ends:
14 transmitting the transmit output radio signal. So is it your position that that
15 is a modeled signal?

16 MR. ROEHRICK: It is our position that the claimed received
17 radio signal, which begins in 4a, is in this case is the modeled signal because
18 that is what corresponds to a representation.

19 JUDGE SAINDON: But what about the signal in Claim 1, is this a
20 real signal, a modeled signal?

21 MR. ROEHRICK: Do you mind if I pull Claim 1 in front of me so
22 we can follow along? I just want to make sure I'm not missing it.

23 JUDGE SAINDON: Sure. We have it on your Slide 4, if that's
24 more convenient.

25 MR. ROEHRICK: Your Honor, which limitation?

1 JUDGE SAINDON: So the very last limitation in Claim 1,
2 transmitting the transport -- I'm sorry, transmitting the transmit output radio
3 signal.

4 MR. ROEHRICK: Correct. And so our interpretation for 4A is
5 that the "a received radio signal" would be a modeled signal that
6 corresponds to a representation of the transmit output radio signal that was
7 transmitted in Limitation 1E.

8 JUDGE SAINDON: So it corresponds to a representation of the
9 actual transmitted signal?

10 MR. ROEHRICK: Correct.

11 JUDGE SAINDON: So I guess I'm struggling to see how this is
12 modeled. I mean, the signal was transmitted, it exists.

13 MR. ROEHRICK: Because -- I'm sorry.

14 JUDGE SAINDON: Go ahead.

15 MR. ROEHRICK: Because the modeled signal is the received
16 signal. That's a new signal. And it is a model that is based off the
17 transmitted signal, which is a separate signal.

18 JUDGE SAINDON: So the system gets a signal and then models
19 it. And then that modeled signal is the one that's passed on in Claim 4A?

20 MR. ROEHRICK: That is what in this -- for these claims what
21 received radio signal would cover, yes, Your Honor.

22 JUDGE SAINDON: Okay. I understand.

23 JUDGE GALLIGAN: Hey, Counsel, this is Judge Galligan in
24 Dallas. So I wanted to follow up on this a little bit. I think Patent Owner
25 says, look -- they look at your petition and they -- their response is that

1 Holt's teachings, which I think Petitioner is relying on for this, are of a
2 modeled signal and it's not an actual signal, which is, according to Patent
3 Owner, what the petition is set forth.

4 Your reply then says, well, the claim actually encompasses a
5 modeled signal. So walk me through the petition. Where is the allegation in
6 the first instance that Petitioner is saying that the combination teaches a
7 modeled signal rather than an actual signal that's fed back?

8 MR. ROEHRICK: Yes, Your Honor So we would be -- it's where
9 we pointed to Holt Figure 3, and where we -- and I believe in Holt Figure 3
10 is the figure in which there is the encoder and decoder models, and in
11 between them is the channel model. And in that, the petition discusses how
12 that demonstrates a modeled signal being received by the receiver. And
13 what Petitioner sees with this argument is that essentially, in our petition, it
14 was rebutted in response with essentially a claim construction argument.

15 And the way Petitioner sees it is that, well, if Patent Owner wants
16 to say it has the received signal, one, we disagree with that, which I can
17 show that in the next slide. Because one of the other patents actually
18 specifically contemplates the received model can be from a modeled form of
19 noise. But on top of that, the Board previously agreed that Holt teaches
20 -- that Petitioner has shown that Holt teaches a modeled signal being used
21 for a distance metric. And if we agree with that and we agree that a received
22 signal can include this modeled signal, then that should read on Claim 4
23 here.

24 JUDGE GALLIGAN: Yeah. And I can see your point. And if in
25 the first instance, however, you -- the Petitioner cast its lot and said, we're

1 going with an actual signal, that Holt teaches this idea of a -- I think, in the
2 petition, and I'll find it. It says -- it cites column 18, line 1 to 2 in the
3 petition, maybe 73 -- give me a moment. Yeah, on page 70, a POSITA
4 would understand that using transmit signals actually received and recovered
5 at a receiver, as taught in Holt would have provided a known improvement,
6 and stuff like that.

7 I'm trying to figure out -- Patent Owner seems to be saying, look,
8 you're alleging -- the Petitioner's contention in the first instance is that you're
9 talking about an actual signal, not a modeled signal. And if that's the case
10 and they come back and they say, well, there's no actual signal, then maybe
11 a claim construction argument is a little too late at that point, if you're first
12 -- if the Petitioner's first allegation was the actual signal.

13 So if you could just point me more directly to where in the petition
14 the actual signal -- and I know there's this footnote. I'm rambling a little bit,
15 but it's an important point. I think there's a footnote. I think you've cited
16 some stuff in the reply, but I just wanted to walk through with you. Because
17 my understanding of the petition was that it was really talking about an
18 actual signal, and maybe I misread it.

19 MR. ROEHRICK: Your Honor, our position would be that Claim
20 4 is broad enough to encompass both an actual and a modeled signal. In the
21 petition, both theories were presented. Now, we do understand that the
22 Board may have disagreed with the actual signal theory being taught. But
23 we also believe that the modeled signal theory was in there as well. And
24 again, we're pointing to the exact same portion of Holt that we're referring to
25 earlier, which is, again -- I believe it's Figure 3, exact same material, exact

1 same prior reference, no new combinations.

2 And we would also say that this appears somewhat similar to
3 -- there was a Federal Circuit decision in 2023 called *Axonics v. Medtronic*,
4 that's in Volume 75 of the Federal Reporter 4th series. And there's two
5 quotations that are apt here. The first is, I believe, at 1380 to 1381 where it
6 says, "There's no rule, for example, requiring a petition to describe all
7 possible or reasonable claim constructions and to present invalidity theories
8 under those constructions."

9 And then second, on page 1384 of that decision where it says, "At
10 least where it relies on the same embodiments for each invalidity ground as
11 were relied on the petition." Let me say the whole part of that again. It's a
12 little bit long. But we hold that "where a Patent Owner and IPR first
13 proposes a claim construction and a Patent Owner response, a petition must
14 be given the opportunity in its reply to argue and present evidence of
15 anticipation or obviousness under the new construction, at least where it
16 relies on the same embodiments for each invalidity ground as were relied on
17 in the petition."

18 JUDGE SAINDON: Counsel, I have one other question. We're
19 running a little short on time. But this is the same claim limitation that I just
20 clicked off of. But again, you're relying on Figure 3 of Holt.

21 MR. ROEHRICK: That's correct. And if you don't mind, I could
22 bring up a slide that shows that, in case you find that helpful.

23 JUDGE SAINDON: It's all right. I have it on another screen here.
24 So the first loss function is between what goes into the encoder and what's
25 coming out of the decoder.

1 MR. ROEHRICK: Mm-hm.

2 JUDGE SAINDON: And there are some other figures with some
3 different permutations of where it's pulling the information. But the claim
4 says -- and that was what I was trying to click on, here we go -- that the
5 distance metric is between the transmit radio signal and the received radio
6 signal. And in my mind, the transmit radio signal is that which was
7 transmitted, and the received is that which was received. And Figure 3 has,
8 before you transmit is what goes into the encoder, and after you have
9 received and decoded is what comes out of the decoder model.

10 So really, what the claim is requiring is more along the lines of
11 -- let's say where items 206 and 210 are drawn in Figure 3 of Holt, rather
12 than 204 and 214 that drive the first loss function. Am I understanding that
13 incorrectly, in your view?

14 MR. ROEHRICK: Respectfully, yes, we do believe there is an
15 incorrect interpretation there. We would read the -- and I apologize, I
16 changed to Slide 19 because I thought that'd just be a little more apt and a
17 little easier for everyone to follow at this conversation. The distance metric,
18 the transmit radio signal is corresponding to the "a transmit radio signal"
19 that's in Limitation 1A. And so we would read that as signal 204,
20 essentially, like a candidate transmit signal, not the later transmit output
21 radio signal that's in Limitation 1E.

22 And as to 214 showing the (INDISCERNIBLE) that in the first
23 loss function, we would understand that 214 would correspond to the
24 received radio signal that was actually received by the decoder. In this
25 instance with 214, it's a signal, just as it's going, it should be equivalent to

1 the same received signal. Because there should not at that stage be any
2 additional interference, at least at that point in time.

3 JUDGE SAINDON: Okay.

4 MR. ROEHRICK: Because you could just as easily argue, if you
5 go back to 210, is that the received or is that the transmitted signal coming
6 from channel -- the channel model? If that makes sense, Your Honor.

7 JUDGE SAINDON: Okay. I understand. Thanks.

8 MR. ROEHRICK: Now I know we're running a little bit short on
9 time. I would like to save a minute for rebuttal. I'm going to very quickly
10 address one brief point, and I'm going to show -- and I'm going to zip
11 through this.

12 Okay. And quickly what I'm going to show is the '540 Patent and
13 Claim 12 and Claim 13. And in Claim 13, you see right there the received
14 radio signal can include using a modeled source of distortion or interference.
15 And in the related inter partes proceeding, the Board actually agreed that this
16 did show a modeled signal. And if we understand -- and the case law I
17 would bring up very briefly on this, it is on the tip of my tongue. It's a little
18 something -- little fuse, excuse me. The 2022 Federal Circuit decision
19 specifically says that if there's a dependent claim with a limitation, you must
20 therefore interpret -- the independent claim must also include that by
21 definition.

22 And also, very quickly, I would also refer to the 2005 Federal
23 Circuit decision, *NTP v. Research in Motion*, which says that if you have
24 related patents -- in this case, all these patents are either are direct parents
25 and child, as in continuations, not continuation parts -- all claims must be

1 interpreted consistently.

2 Thank you. And I will save the remaining 10 seconds for rebuttal.

3 JUDGE SAINDON: Thank you.

4 MR. HELGE: Good afternoon, Your Honors. Wayne Helge, for
5 Patent Owner DeepSig. May it please the Board. Your Honors may have
6 noticed from DeepSig's demonstrative exhibits that we only showed up
7 today planning to talk about Claims 4 through 6, 12 through 14, 20 through
8 22. Your Honor, Judge Saindon, you asked earlier, are the arguments the
9 same as to Claim 1 as they were in the Patent Owner response and the Patent
10 Owner's preliminary response.

11 And we will 100 percent concede that we are presenting only those
12 same arguments. We recognize how that may turn out, given the institution
13 decision. But we did not include an expert declaration, no new evidence, no
14 new arguments. We hope that helps the Board a little bit in trying to decide
15 the Claim 1 issue.

16 What we'd like to do today with our time is focus purely, really, on
17 this Claim 4 issue. And I think that there is a very simple slide that we have,
18 Slide 18 of our demonstratives, which I won't go to Your Honor. But Slide
19 18 has a very summary point, which is -- and Your Honor, I'm going to
20 pronounce it probably Jüschke is kind of how we --

21 JUDGE SAINDON: We've pronounced it completely different
22 than everybody, so it's fine.

23 MR. HELGE: Do Your Honors have a preference?

24 JUDGE SAINDON: No.

25 MR. HELGE: Okay. So the Jüschke and Holt combination comes

1 up short as to Claim 4. We know from Jüschke that there is a transmitter-
2 side-only feedback loop. There's nothing from a receive side. There's no
3 receive signal that goes into this feedback loop. Holt, the problem is when
4 you get into Figure 6 and Figures 11 and you start looking at the use of an
5 actual channel, that's only used for training the decoder. So you never get to
6 this idea in our patent where you're training or tuning the predistortion
7 model on the transmit side. In that combination, you never have it.

8 Now, this is an issue that the Board, to be honest, has dealt with
9 quite a few times already. As Your Honors, know the IPR2025-00049 case
10 had the same issue, the Holt and Jüschke combination. IPR2025-00194 had
11 the same issue. There was a rehearing request in each case, once to the
12 panel, once to the Director. Obviously, Your Honors have seen this again
13 here in the institution decision. In our view, we didn't provide an expert
14 declaration in this case. From what we've read from the record and from
15 these prior records, we don't think an expert is going to provide any further
16 expertise than the Board already has as to these references and these
17 combinations. It seems as though the Board fully understands these
18 references.

19 Now, I think one very important issue here today of course, has
20 Petitioner changed its theory? A hundred percent the answer to that is yes.
21 And Judge Galligan, you were pointing to some other material in the petition
22 that I liked as well. But I'm going to pull up a sentence from the bottom of
23 page 68 in the petition, this is where Petitioner is coming forward with its
24 Holt and Jüschke combination. And in this last sentence here on page 68,
25 they say, "Therefore, POSITA would have understood that feedback from a

1 transmit output radio signal transmitted to a radio receiver would correspond
2 to a representation of the transmit output radio signal received at a radio
3 receiver."

4 As Judge Saindon said before, we're talking about a physical signal
5 that was transmitted and received at a radio receiver. Now, one of the
6 issues, Judge Saindon, that you raised was, are we talking about the same
7 signal and the transmitting step of Claim 1 as we are when we get into this
8 obtaining a received radio signal in Claim 4? What Petitioner can't really
9 point to, either in the petition or in its papers or in its theories or even today
10 at this hearing, is if you're if you're only looking at a modeled received radio
11 signal, where is the radio receiver?

12 There is none. It doesn't make sense. Frankly, it's a theory that
13 sort of peters out after you get to this idea of representation. But as I said
14 here on page 68 of the petition, they tell you exactly what they think the
15 representation is. It's the feedback from the transmitted signal once it's been
16 received by the radio receiver. This whole idea of using a modeled signal
17 instead of a received signal, despite the expressed claim language is -- in
18 fact, Your Honors, it's new and it's wrong. It doesn't work.

19 JUDGE GALLIGAN: Counsel, let me ask you about that so as a
20 matter of claim construction here. I was looking at the patent and looking at
21 column 8 of the '704 Patent here. If we go to column 8, line 55, and this is
22 describing Figure 4, which is a flowchart -- and I'm going to try to get my
23 two screens working here.

24 But column 55 there -- or sorry, column 8, line 55 says "the system
25 obtains a received radio signal corresponding to input of a radio receiver by

1 processing the pre-distorted candidate transmit radio signal using one or
2 more sources of distortion or interference 406." And that to me sounds like,
3 on the transmit side, you would basically factor -- take what you transmit,
4 factor and expect distortion to get a distorted signal that would be a modeled
5 signal received on the on the receive side. Is that not right?

6 MR. HELGE: Well, Your Honor, I'm going to be you that I had
7 not read that particular disclosure in the way that that you have. I hadn't
8 viewed it that way. I mean, we do have in 408 the computing a distance
9 metric between the candidate transmit radio signal and the received radio
10 signal -- corresponding to an input.

11 So Your Honor, can I throw something out here? Because I think
12 what we're talking about in this embodiment is more akin to Figure 5A,
13 which is dealing purely with modeled signals. In fact, you know, we do
14 have some disclosure of modeled signals. I recognize that. And we did talk
15 a little bit about this in our sur-reply. Figure 5A is distinguished from
16 Figure 5B. Because in Figure 5A, you don't have a receiver. You have what
17 we call a modeled received radio signal.

18 That's in contrast to Figure 5B and also Figure 1, where you have
19 an actual receiver, a received signal that's then fed back and used for the
20 training of the model. So I think, Your Honor, what I'm seeing here is that
21 Figure 4 is dealing with the pure model system, which they call really a
22 model. But again, I think it deals more with Figure 5A.

23 JUDGE GALLIGAN: It just happens to use very similar language
24 to the claim. In fact, almost identical corresponding to -- so if we're going to
25 construe the claim in light of the spec, it would seem like we'd have to give

1 some thought to how, you know, the claim might cover both, might cover an
2 actual received signal and a modeled received signal; just a thought.

3 And I had another question on just kind of intellectual curiosity.
4 Because obviously, there's the modeled signal disclosure in 5A and then
5 Figure 5B, and the patent has this. This idea that the receiver receives
6 something and it sends it back to the transmitter, or it sends it back to this
7 predistortion system that has some way to use both the -- it produces the
8 transmit signal that gets the received signal. How does that work? Because
9 I'm thinking of a cellular system or radio system. So it actually -- a base
10 station would broadcast something, and then that would just bounce it back?

11 MR. HELGE: So no, Your Honor. And if I can, I would like to
12 reserve a moment later to respond to your prior question about the claim
13 construction. But no, so I think, Your Honor, at this point what we're really
14 dealing with is the received signal -- we see it a little bit in the claim
15 language. We talk about a representation of a received radio signal. And so
16 that representation can be in effect at a computerized level, right? We could
17 be -- we're not simply transmitting a signal back because, of course, that
18 causes other problems.

19 JUDGE GALLIGAN: Right.

20 MR. HELGE: Once we get into post receiver, we're really talking
21 about feedback. Again, the term in the claim is representation, but we're
22 really talking about what other -- whatever form the data may be regarding
23 that data or corresponding to identifying that type of data, the quality of it,
24 characteristics of the data, and characteristics of the signal. So that then they
25 -- I can go back into, you know, the nonlinear predistortion machine learning

1 model, right, into that.

2 JUDGE GALLIGAN: I see. So it's more just data, what you're
3 -- what the Patent Owner is reading Claim 4 to cover would be. It's
4 obtaining a received radio signal that corresponds to, it's really just data that
5 would provide some indication of certain metrics that can then be used, for
6 instance, to determine the distance metric. Is that what you're saying?

7 MR. HELGE: I think that's fair. You know, we weren't specific
8 about what that representation form had to be. But it does need to be
9 characteristic of the signal that was actually received, if that makes sense,
10 Your Honor.

11 JUDGE GALLIGAN: And the position is that it cannot be
12 modeled on the transit side?

13 MR. HELGE: Well, our position, Your Honor -- and this kind of
14 goes back to your other question about claim construction in light of the
15 specification. The important part here that I'm seeing is, what does a
16 representation of the transmit output radio signal received at a radio's
17 receiver? The important thing that we would say is it can't be modeled.
18 Because at what point is a modeled signal received at a radio station? And it
19 isn't. The answer to that is it isn't.

20 And again, you know, Figure 1, Figure 5B of our patent are
21 dealing with what we're talking about in this claim 4, which is you have a
22 receiver that has received a signal. And so it can cover the -- you know, if
23 you were to say, well, let's take out the received at a radio receiver, maybe
24 then we have a different discussion. Maybe then we say, well, what does
25 representation mean? How broad is representation? But the fact that we

1 have in that claim the requirement that it's received at a radio's receiver, it
2 really shortcuts the possibility of having any purely modeled signal that's
3 never received. It's simply existing, you know, as in Figure 5A, existing in
4 the context of a computer simulation.

5 JUDGE GALLIGAN: Potentially. But for the disclosure and
6 within the patent, column 8, in line 55, which you'll -- I presume you'll
7 address on the claim construction issue. Meaning, received may not mean
8 actually received at the receiver; it may mean, you know, a modeled signal.
9 But that's sort of then the big question, right?

10 MR. HELGE: Well, it is -- I don't think it is a big question, Your
11 Honor. Because in Figure 5A, we have Element 505, which they -- which
12 we call in the patent a modeled received radio signal. When something's
13 modeled, the patent doesn't leave you guessing. It doesn't leave you saying,
14 is this modeled or not, if patent says modeled.

15 And so I think, you know Figure 5A, going back again to the
16 Figure 4 method, if you notice in Figure 4, there's no transmission, right?
17 There's no transmission of a signal. When you go through all the elements
18 of Figure 4, you're obtaining a candidate transmit radio signal. You're
19 processing it. You're obtaining a received radio signal. But this is all
20 computerized.

21 Again, this is looking at the Figure 5A embodiment and sort of
22 walking you through what that pure computerized where you don't transmit,
23 so you don't have Claim 1; you don't receive, so you don't have Claim 4. It's
24 a separate embodiment. It's dealing with a different disclosure. These
25 claims are not focused on what's in Figure 4, Your Honor. So the column

1 eight, line 55 disclosure, to me is we're talking about model material at that
2 point in the context of the embodiment of Figure 4 or Figure 5A.

3 I know that we had some disclosures that we cited to in our sur-
4 reply that dealt with Figure 1, Figure 5B, where we didn't have this term
5 "modeled" showing up, and we had actual transmission and we had actual
6 receipt. And so to me, what I would propose Your Honor is if you're
7 looking at Figure 4 and Figure 5A, to figure out what a non-modeled signal
8 is, it's probably not the right citation. We would refer you, Your Honor, to
9 the 5B disclosures, Figure 1 disclosures.

10 JUDGE SAINDON: Counsel, if I could interrupt you before you
11 get started on the next part. I'm reading Claim 4, and I see obtaining a
12 received radio signal that corresponds to a representation of, and then we
13 have the transmit part. Now that transmit part that finishes that clause, the
14 way that I was understanding it is it's an antecedent basis reference back to
15 the last limitation of Claim 1. And they don't use the exact same language
16 because something has happened.

17 That's why we have "received at" instead of "to" -- you know, in
18 Claim 1 it said to the one or more radio receivers, now it's received at. So it
19 does make sense in that way. But do you also understand that the -- of the
20 transmit audio, transmit output radio signal, et cetera, that is referring to the
21 last limitation of Claim 1?

22 MR. HELGE: A hundred percent, Your Honor, 100 percent agree
23 with that, yes. I know that we have -- I put up -- for Judge Galligan's
24 reference, I did put up Slide 5, just because we have Claim 4 up there with
25 some red highlighting. And I'm happy to talk about the red highlighting if

1 we if we need to. But I think, Your Honor, one other point can I make real
2 quick about the determining step is in -- on this one point, I do agree with
3 opposing counsel, which is the transmit radio signal that shows up in the
4 determining step, we do think is a predicate signal before it has been
5 transmitted.

6 You know, there's a there's a transmit radio signal in the obtaining
7 step of Claim 1. Once you get to what's been transmitted, as in the last step,
8 we have the transmitting the transmit output radio signal. So that output
9 term is a little bit different once you actually physically transmit it. But I do
10 agree with Your Honor that you have to transmit a signal, and you have to
11 receive a signal in order to practice Claim 4.

12 JUDGE SAINDON: Okay. So let me repeat and to make sure that
13 I understand. Determining a distance metric between the transmit radio
14 signals, the transmit radio signal is to be transmitted from Claim 1?

15 MR. HELGE: Yes, Your Honor.

16 JUDGE SAINDON: And the received radio signal is referring
17 back to the a -- obtaining a received radio signal, and then the part we just
18 talked about, which is the transmitted signal from Claim 1?

19 MR. HELGE: Yes, Your Honor, I think you got it.

20 JUDGE SAINDON: So I was looking at Holt figure, I think it was
21 3. And earlier when we were talking with Petitioner's counsel and I was
22 thinking that we were looking at 206 and 210 -- maybe it's not what 206 and
23 210 actually are, but at those spots.

24 MR. HELGE: Mm-hm.

25 JUDGE SAINDON: And you're saying 204 and 210 or 204 and

1 214?

2 MR. HELGE: I think it is 204 and 214, Your Honor.

3 JUDGE SAINDON: Okay.

4 MR. HELGE: But again, you know, obviously Holt, the first loss
5 function, we're really talking about a model. We're not talking about any
6 received signal. We're not talking about a transmitted signal. The channel
7 itself is a model, right? We don't have -- we're kind of operating purely in
8 the computer realm in Figure 3.

9 But I think there's another problem also here, Your Honor. And
10 that is -- you can see it in Figure 4, which I've got Figure 3 and Figure 4 up
11 on the screen. Figure 4 inputs the first loss function into the decoder model.
12 And you can see some comments at the bottom of Figure 4, and you do back
13 propagation through the decoder model with modification. That means
14 you're using some of the first loss function to train the decoder model in
15 Holt's Figure 4.

16 You then get to the channel, and you're back propagating without
17 modification. That means you don't do any tuning of the channel. You
18 leave it as is. There's another -- actually, Figure 5 of Holt gets more into
19 figuring out what an actual channel and a model channel or how they differ.
20 But then you get to the encoder model, and you have back propagation with
21 modification. So there is some tuning of the encoder and the decoder using
22 the first loss function, again, only purely in the model scenario. But by the
23 time you get through the decoder model, you've already used up some of that
24 first loss function to tune the decoder model.

25 So what's left? Well, Holt is a little bit coy about it. Point being,

1 you don't have the entire first loss function left by the time you get to the
2 encoder. You're using that first loss function to do double duty. That's not
3 what our claim is about, because we have a distance metric that's used for
4 predistortion tuning of the of the encoder. And so, you know, once you get
5 through the decoder model and you've used some of that loss function to
6 make some adjustments of the decoder side, what do you have left? Well,
7 you have something left, but it's not the first loss function anymore. So
8 whatever gets to the encoder model isn't the first loss function anymore. It's
9 the remainder of whatever tuning hasn't been used.

10 So Your Honor, I've got about 11 minutes left. In truth, I think I
11 really only have two major points. One, we think that this issue has been
12 decided already in the in 0049 and 00194 IPRs. The Holt and Jüschke
13 references, when combined, don't get you the tuning of a transmitter, a
14 predistortion system on the transmitter side, using a distance metric between
15 a transmitted or a to be transmitted signal and a received signal received at a
16 receiver. That combination falls short. We think that that consistency with
17 what happened in those other cases answers the question here.

18 What Petitioners come in with is a new argument. They're trying
19 to get you to believe that a modeled signal answers the question. Page 68 of
20 the petition shows you that's not what they were thinking. Judge Galligan,
21 you pointed out some other portions we have in our sur-reply. We have
22 portions from page 67 to 76 of the petition that repeat over and over again,
23 actual received signal. That's the heart of their theory. That's what's in the
24 claim.

25 It's a signal received at a radio receiver. They fell short. It's a new

1 argument. It's wrong in any event. Because even when you get to Figure 1
2 -- or I'm sorry, both Figure 3 and Figure 4, this first loss function, they still
3 come up short. You don't have a distance metric between a to be transmitted
4 signal and a received signal in a radio receiver that then gets used to tune a
5 predistortion system in the manner required by the claims.

6 If Your Honors have any other questions, I'm happy to answer
7 them. But I don't want to spend the next nine and a half minutes standing up
8 here babbling, because I think we've answered the question. I've said what
9 I've had to say.

10 JUDGE SAINDON: All right. Thank you.

11 MR. HELGE: Thank you Your Honor.

12 JUDGE SAINDON: Okay. One second here. Okay. So
13 Petitioner, you have almost no time. But if we -- I am inclined to give you at
14 least a minute if there's anything specific. We don't need to hear repeats or
15 rehashes of your prior arguments. But if you have any direct response to
16 what Patent Owner said. And then Patent Owner an extra minute -- not that
17 you need an extra minute.

18 MR. HELGE: Sure.

19 JUDGE SAINDON: But if you have anything specifically
20 responsive to what was said just now, you can quickly go through that.

21 MR. ROEHRICK: Yes. Rebutting two points. The first is the
22 heart of Patent Owner's argument has been that this received signal had to be
23 an actually received signal. And I think, as we previously showed in -- I
24 believe it was the '540 Patent, that the dependent claim clearly contemplates
25 a modeled signal being such a signal. Which I remember in one of the other

1 decisions, the Board specifically said, well, we think that these two terms are
2 unique, and we believe that that Claim 13 to the Claim 12 comparison shows
3 that it is contemplated that received signal can be a modeled signal.

4 And in reference to Claim 4, in which -- I just want to have the
5 language in front of me very quickly. It is "foresee updating the values of
6 the modeled parameters for the particular deployment scenario." The
7 language is based at least on the distance metric. And based at least on the
8 distance metric, it is very broad. So this, again, goes right to the heart of
9 how somehow the back propagation doesn't teach it. We disagree. This is
10 very, very broad language. It does not strictly say that there cannot be any
11 other in between steps. Thank you.

12 JUDGE SAINDON: Thank you. And Patent Owner if you have
13 anything further?

14 MR. HELGE: Very quickly, Your Honor. It's got to be received
15 by a receiver. Modeled signal is not received. That really should end the
16 story. Thank you, Your Honor.

17 JUDGE SAINDON: All right. Thank you. All right, that
18 concludes the oral hearing today.

19 (Whereupon, the above-entitled matter went off the record at 2:56
20 p.m.)

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